US NAVY NORTHERN DIVISION
REMEDIAL ACTION CONTRACT (RAC)
CONTRACT NO. N62472-94-D-0398
DELIVERY ORDER NO. 0013

WORK PACKAGE NO. 5
WASTESTREAM HANDLING

TANK FARM NO. 4 REMEDIAL ACTIONS
NAVAL EDUCATION AND TRAINING CENTER (NETC)
NEWPORT, RHODE ISLAND

June 1996

Prepared by

Foster Wheeler Environmental Corporation
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Revision	Date	Prepared By	Checked By	Approved By	Pages Affected
0	6/7/96	K. Shah	M. Zizza	J. E. Holwell	All

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WORK PACKAGE NO. 5 COMPONENTS

1.0 INTRODUCTION

1.1 Project Background

The Naval Education Training Center (NETC-Newport) Tank Farm No. 4 is a 90-acre site located in the Town of Portsmouth, Rhode Island. The tank farm contains 12 large underground storage tanks (USTs), numbered 37 through 48, and was constructed in the early 1940's for fuel oil storage. The USTs were in operation until the late 1970s.

Following the enactment of revised UST regulations in 1992, the Navy initiated the process for permanent closure of the tanks. Under Remedial Action Contract N62472-94-D-0398 Delivery Order No. 0013, Foster Wheeler Environmental Corporation (Foster Wheeler Environmental) was selected as the Contractor to complete the closure of twelve USTs in Tank Farm No. 4.

1.2 Overview of Work Package No. 5

Work Package No. 5 contains the necessary details to provide or install and operate various waste handling facilities required to support project activities. Work Package No. 5 activities will begin immediately after mobilization and end upon final demobilization and site restoration. Work Package No. 5 includes documents and a drawing related to installation or provision and operation of wastestream handling facilities. The major site activities addressed in this Work Package are as follows:

- Construction of selected Water Treatment Facility (WTF) components by Foster Wheeler Environmental
- Operation of the WTF
- Procurement of services for metal recycling and waste disposal
- Procurement of services for design and construction of the remaining WTF components
- Handling and storage of excavated soil
- Handling and storage of metals/steel

1.3 Work Package No. 5 Components

This section provides an itemization of Work Package No. 5. The components of this Work Package, which support overall project schedule, including those that have been previously reviewed and issued, are included with this package. Each component forms a separate document that may be revised on an individual basis; the Submittal Register should be referred to to identify the latest issued revision of each component.

1.3.1 Site Logistic Work Packages (SLWPs)

A number of activities, including supply and installation of various components, will be performed by Foster Wheeler Environmental to meet project requirements. Activities to be performed by Foster Wheeler Environmental are detailed in the SLWPs. The SLWP associated with Work Package No. 5 is as follows:

- SLWP-1284-13-05 Water Treatment Facility

1.3.2 Standard Operating Procedures (SOPs)

The following SOPs have been developed as part of this Work Package to support WTF operation, on-site handling of metals/steel for off-site recycling and on-site handling of wastestreams for off-site recycling or disposal:

- SOP-1284-13-10 Soil Handling and Storage
- SOP-1284-13-11 Water Treatment Facility
- SOP-1284-13-12 Steel Processing and Handling

1.3.3 Subcontracts and Procurement

Statements of Work (SOWs) have been prepared for subcontracted services or major items with performance requirements. For specialty tasks that will be performed or supported by subcontractors, the following SOWs will be used initially for procurement purposes and subsequently to monitor subcontractors' field activities:

- SOW-1284-13-11 Wastewater Treatment System Operation
- SOW-1284-13-12 Waste Transportation and Disposal Services
- SOW-1284-13-13 Demolition Scrap Metal Recycling

1.3.4 Drawings

The following drawing is associated with Work Package No. 5:

- 1284.0013.P1 Process Flow Diagram

1.4 Data Gaps

The following items identified during Work Package No. 5 development represent data gaps at the time of issuance. These data gaps will not constrain construction efforts except in areas as noted below. Foster Wheeler Environmental is continuing to work with the Navy to close these data gaps.

1.4.1 Utilization of Temporary Structure

A Prefabricated Temporary Membrane (PTM) building of approximately 60 feet by 80 feet was planned to be installed to shelter the proposed WTF with the exception of oil/water separators and two frac tanks. The purpose of the PTM building is to:

- Minimize impact of lighting on the adjacent Navy residences
- Minimize impact of noise from the WTF on the adjacent Navy residences
- Improve WTF operator productivity
- Minimize storm water runoff quantity within the WTF area

However, Foster Wheeler Environmental believes that it would not be cost effective to lease or install a PTM building if the facility is not to be operated during winter months. Therefore, Foster Wheeler Environmental recommends that a PTM building not be installed unless the work is planned to continue during winter months. It is recommended that project activities proceed

without installation of a PTM building and that an evaluation be made in the August/September time frame as part of an overall decision of continuing operations into winter months based upon the following:

- Progress and remaining work
- Cost considerations for freeze protection Vs mobilization and demobilization
- Snow removal cost
- Decreased productivity
- Increased cost of WTF equipment and O&M
- PTM building cost

A field change request (FCR No. 1284-0013-001) to postpone/cancel installation of a temporary structure over the WTF is being submitted to the Navy. Hence, issuance of a Statement of Work for a temporary structure is currently on hold pending the Navy decision.

1.4.2 City of Newport POTW Permit

A Publicly Owned Treatment Works (POTW) Permit application was prepared by Foster Wheeler Environmental and forwarded to NETC on March 22, 1996. This Permit application was forwarded to the Newport POTW on April 3, 1996. Prior to discharge, this Permit must be received and reviewed to ensure assumptions made in the development of project plans are valid.

2.0 PROJECT EXECUTION - WORK PACKAGE NO. 5

2.1 Water Treatment Facility

The WTF Subcontractor will design, supply and install various components of the WTF providing a continuous overall system throughput of 300 gpm per SOW-1284-13-11. These components will be skid mounted for ease of installation and removal. The components include pumps in the influent tank UST-43, oil/water separators, bag filters, granular activated carbon (GAC) units, controls for the influent tank (UST-43) and effluent tanks (two frac tanks and potentially UST-44), piping and associated appurtenances. The WTF Subcontractor will also provide power distribution to the WTF components and system testing. Foster Wheeler Environmental will operate the WTF; however, the Subcontractor will provide plant operation training to Foster Wheeler Environmental personnel.

Foster Wheeler Environmental will supply and install two 20,000 gallon frac tanks and an associated effluent pumping system per SLWP-1284-13-05. Foster Wheeler Environmental will construct a pad (80 feet by 100 feet) with secondary containment for installation of the WTF components, frac tanks and associated pumping system as detailed in SLWP-1284-13-05. Foster Wheeler Environmental will also supply pumps for UST-44 which may be needed to supplement the effluent storage capacity of the frac tanks. After the initial plant operation training, Foster Wheeler Environmental will operate the WTF as detailed in the SOP-1284-13-11. No freeze protection is provided for the WTF since, at this time, activities are not expected to be conducted during the harsh winter months. The WTF can be drained to provide protection from freezing during the winter months. Alternately, a temporary structure could be constructed with the necessary insulation/heating to provide for operation through the winter months as part of overall site winterization if it is deemed to be necessary; see Paragraph 1.4.1, above.

2.2 Waste Disposal

A number of liquid and solid wastestreams requiring off-site disposal will be generated by planned site activities. These wastestreams include, but are not limited to, product oil, RCRA hazardous and non-hazardous product residuals from the USTs, oil contaminated debris and sludge, oil contaminated PPE/debris, oil contaminated soil, bag filters from the WTF, clean construction debris, decontamination water at the tail end of the project, and miscellaneous lab pack chemicals. Foster Wheeler Environmental will also perform various analyses in accordance with the Sampling and Analysis Plan (SAP) for RCRA classification of wastestreams. Foster Wheeler Environmental will also perform field screening analyses as per the SAP. The off-site laboratory services will be procured as per SOW-1284-13-07 for wastestream analyses.

The wastestreams will be recycled or disposed of at a facility approved or permitted by the applicable regulatory agencies as per the Waste Management Plan. The DOT certified Subcontractor will provide the waste transportation and recycling/disposal services including supply of containers, laborers, drivers and equipment as per SOW-1284-13-12. The Subcontractor will be responsible for documenting proper recycling or disposal of wastestreams. If additional analyses beyond those provided by Foster Wheeler Environmental are necessary for acceptance of a wastestream at the recycling or disposal facility, the Subcontractor will be responsible for performing them at his own expense. Foster Wheeler Environmental will be responsible for placement of wastestreams in the DOT approved waste containers and also be responsible for preparation and signing of the manifest.

2.3 Metal Recycling

Site activities such as removal of loop/shunt piping, pump chamber equipment/piping, and tank piping will generate an estimated 700 tons of scrap metal/steel which will be decontaminated and transported off-site to a metal recycling facility. The services for transportation and recycling of metals at an off-site facility will be provided by the subcontractor as per SOW-1284-13-13. The Subcontractor will also be responsible for the supply of labor, drivers, containers and equipment. Foster Wheeler Environmental will be responsible for placement of metals in the containers as per SOP-1284-13-12. Foster Wheeler Environmental will certify that the pipes have been cleaned in accordance with the SOP-1284-13-07.

U.S. NAVY NORTHERN DIVISION
REMEDIAL ACTION CONTRACT (RAC)
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SITE LOGISTICS WORK PACKAGE
FOR
WATER TREATMENT FACILITY
SLWP-1284-13-05

TANK FARM NO. 4 REMEDIAL ACTIONS
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0	6/7/96	J. Brinkman	M. Zizza	All

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1.0 INTRODUCTION

Foster Wheeler Environmental Corporation (Foster Wheeler Environmental) will perform closure activities for the 12 underground fuel storage tanks in Tank Farm No. 4, Naval Education and Training Center (NETC), Portsmouth, Rhode Island. The work is being performed under Remedial Action Contract N62472-94-D-0398, Delivery Order No. 0013. Closure activities will include removal and disposal of UST contents, UST cleaning and repair, and pump room cleaning, equipment removal and repair. This site logistics work package (SLWP) will serve as the basis of design and installation of the selected components of the water treatment facility (WTF) at Tank Farm No. 4 which include the pad for WTF installation, frac tanks, treated water effluent pumping system and associated equipment. All work will be performed in accordance with the Site Health and Safety Plan (SHSP).

Wastewater from USTs and site activities will be pumped to UST-43 for holding prior to treatment on-site. Wastewater will be pumped from UST-43 to the WTF with submersible pumps. The WTF, including the influent submersible pumps, will be supplied and installed by the WTF Subcontractor as described in Statement of Work SOW-1284-13-11. After treatment, the water will be collected in frac tanks and then pumped through a 6-inch discharge pipe and an abandoned 16-inch fuel oil line into the NETC sanitary sewer system, eventually discharging to the City of Newport Publicly Owned Treatment Works (POTW). Effluent sampling will be performed as required to meet the City of Newport POTW permit requirements. Prior to mobilization of the WTF, Foster Wheeler Environmental will construct a pad for the installation of the WTF. The sewer system from the WTF discharge point to the gravity sewer system at Tank Farm No. 5 is detailed in the On-Site Temporary Utilities Site Logistic Work Package (SLWP-1284-0013-02).

2.0 RELATED PROJECT DOCUMENTS

2.1 Related Codes and Standards

The Codes and Standards listed below form a part of this SLWP to the extent referenced in the Technical Specifications provided in Attachment A. The current edition of each reference shall be utilized:

- American Society for Testing and Materials (ASTM)
- Manufacturers Standardization Society of the Valve and Fittings Industry (MSS)
- Occupational Safety and Health Administration (OSHA, 29 CFR 1910 and 1926)

2.2 Related Project Plans

The Project Plans listed below were developed specifically for the Tank Farm No. 4 project and form a part of this SLWP to the extent referenced:

- Work Plan for Remediation Actions at NETC Tank Farm No. 4
- Site Health and Safety Plan (SHSP)
- Environmental Protection Plan (EPP)
- Quality Control Plan (QCP)
- Sampling and Analysis Plan (SAP)
- Waste Management Plan (WMP)

2.3 Related Standard Operating Procedures (SOPs)

The following SOPs were developed specifically for the Tank Farm No. 4 project and form a part of this SLWP to the extent referenced:

- SOP-1284-13-01 Ring Drain Systems
- SOP-1284-13-02 Water Removal
- SOP-1284-13-05 Tank Cleaning
- SOP-1284-13-07 Pipe Draining and Free Liquid Removal
- SOP-1284-13-11 Water Treatment Facility

2.4 Related Site Logistics Work Packages (SLWPs)

The following SLWPs were developed specifically for the Tank Farm No. 4 project and form a part of this SLWP to the extent referenced:

- SLWP-1284-13-01 Site Layout
- SLWP-1284-13-02 On-Site Temporary Utilities
- SLWP-1284-13-04 Tank Cleaning Systems Facilities

2.5 Related Statements of Work (SOWs)

The following SOWs were developed specifically for the Tank Farm No. 4 project and form a part of this SLWP to the extent referenced:

- SOW-1284-13-05 Clearing and Mowing Services
- SOW-1284-13-06 On-Site Electrical Services
- SOW-1284-13-07 Laboratory Analysis of Soil and Aqueous Samples
- SOW-1284-13-10 Temporary Structure
- SOW-1284-13-11 Wastewater Treatment System Operation

3.0 WTF PAD

3.1 Design Criteria

The WTF pad will be located to the southwest of UST-43 on a graded area approximately 100 feet by 80 feet, as shown in the Site Layout Plan (Dwg. No. 1284.0013.C2). The pad will support the three water treatment units, a temporary structure to house the water treatment units (if required), two 20,000 gallon frac tanks for holding treated effluent prior to discharge, two effluent pumps, pump shelters, and associated support equipment.

The WTF pad area will be graded and compacted prior to placement of any material. The compaction requirements will be based on the design load information from the WTF Subcontractor. The details of the WTF pad are provided in the Project Details (Dwg. No. 1284.0013.C4). The WTF pad will consist of the following materials: an underlying 6-inch (nominal) layer of drainage sand, 60-mil HDPE (high density polyethylene) liner, another 6-inch layer of drainage sand to protect the liner, a separating geotextile fabric, and a 3-inch layer of

minus 2-inch crushed stone. The entire WTF pad will be contained by keying the HDPE liner with hay bales and crushed stone.

Hay bales will be placed around the perimeter of the WTF pad, and the HDPE liner will be placed over the bales. The HDPE liner will then be secured with crushed stone. Along the uphill sides of the WTF pad, a shallow trough will be excavated as necessary to divert the runoff around the treatment pad. The HDPE liner will be placed over the hay bales and keyed into the trough with crushed stone.

The WTF pad will also be constructed such that any potential spills on the pad will be collected within a sump area located in the southwest corner of the pad. The sump will consist of a buried 2.5-foot by 2.5-foot by 3.0-foot poly drum (or equal) which will contain a 2-inch submersible pump with level controls. The sump pump (20 gpm capacity) will automatically discharge back to UST-43. If a temporary structure is not constructed, approximately 5,000 gallons of runoff water will need to be pumped to UST-43 for every 1 inch of rainfall.

3.2 WTF Pad Details and Material Requirements

Site clearing and grading of the proposed WTF area (approximately 100 feet by 80 feet) will be completed. WTF pad materials will be procured and the installation will be completed by Foster Wheeler Environmental Construction personnel.

Details of the estimated material requirements are as follows:

- Sand - drainage grade; maximum particle size 3/8-inch and amount of material passing a No. 200 sieve shall not exceed 5%; approximate quantity 300 yd^3;
- Stone - 2-inch (-); maximum of 2-inch and minimum of 1/2-inch; approximate quantity 75 yd^3;
- HDPE Liner - 60-mil thickness preseamed; approximate quantity 9,600 ft^2;
- Geotextile Fabric - Mirafi 500X or equivalent; approximate quantity 9,600 ft^2;
- Haybales - string tied;
- Sump - 2.5 feet by 2.5 feet by 3.0 feet poly drum (or equal);
- Sump Pump - 2-inch submersible pump, "Little Giant" or equivalent, minimum 20 gpm at 10-foot head; and
- Sump Pump Discharge Hose - 2-inch hose, 100-foot length.

3.3 Installation Requirements

The WTF pad will be constructed per Dwg. No. 1284.0013.C4 under the supervision of the Foster Wheeler Environmental Construction Superintendent or his designee. The Construction Superintendent and crew will be responsible for proper installation of the WTF pad in accordance with the details contained in this SLWP.

The discharge hose for the sump will be installed above-ground. The hose will be restrained with sand bags, wood staking or equivalent. No freeze protection will be provided since activities are not expected to be conducted during the harsh winter months.

3.4 Installation Procedure

The following is a general installation procedure for the WTF pad:

- Inspect, handle and store appropriately all materials, fittings and appurtenances upon receipt;
- Clear the WTF pad area;
- Grade area with slope as required toward sump, excavate the sump location and install sump;
- Place and level 6-inch layer of drainage sand, place hay bales around perimeter of pad and stake these hay bales;
- Place HDPE liner over the 6-inch drainage sand layer followed by a 6-inch sand layer over the HDPE liner;
- Place geotextile fabric over the sand layer followed by crushed stone over the geotextile;
- Connect pump, hoses and fittings in accordance with the manufacturer's instructions; and
- Install sump pump and controls in accordance with the manufacturer's specifications.

3.5 Testing Requirements

The installed sump pump including hoses and valves will be tested as described below:

- Utilizing potable water, fill the system by bleeding all air out to ensure that the entire hose is full of water;
- When all the air is out of the line, check to ensure flow and maintain running for a minimum of ten minutes;
- Conduct an in-service inspection of the system for any leaks. Any leaks will be repaired to ensure a water-tight system; and
- Check proper automatic starting and stopping of the sump pump on level controls.

4.0 WTF EFFLUENT PUMPING SYSTEM

4.1 Design Criteria

The WTF is to be provided by the WTF Subcontractor and includes three skid mounted treatment units which consist of an oil/water separator, filtration system and liquid phase carbon (SOW-1284-13-11). The WTF Subcontractor will also supply the submersible pumps to be installed within UST-43 and all associated equipment and controls and controls for UST-44, if it is used to supplement the holding capacity of the frac tanks. The pumps for the UST-44 will be supplied by Foster Wheeler Environmental. A temporary structure, if required by the Navy, will be supplied by a separate subcontractor. Foster Wheeler Environmental is responsible for the procurement and installation of the WTF effluent pumping system which includes two frac tanks (20,000 gallons each), totalizing flow meter, effluent pumps to transfer the treated water to the 6-inch discharge pipe and associated enclosure, valves and appurtenances. The sewer system carrying the pump discharge is detailed in the On-Site Temporary Utilities Site Logistics Work Package (SLWP-1284-13-02). The frac tanks, pumps, piping and valves associated with the frac tanks and effluent pumps will be installed as indicated on Figure 4-1. The process control system for the WTF is discussed in SOW-1284-13-11. The low level signal in the frac tanks will automatically shutdown the effluent pumps. Effluent flow will be monitored hourly and controlled manually.

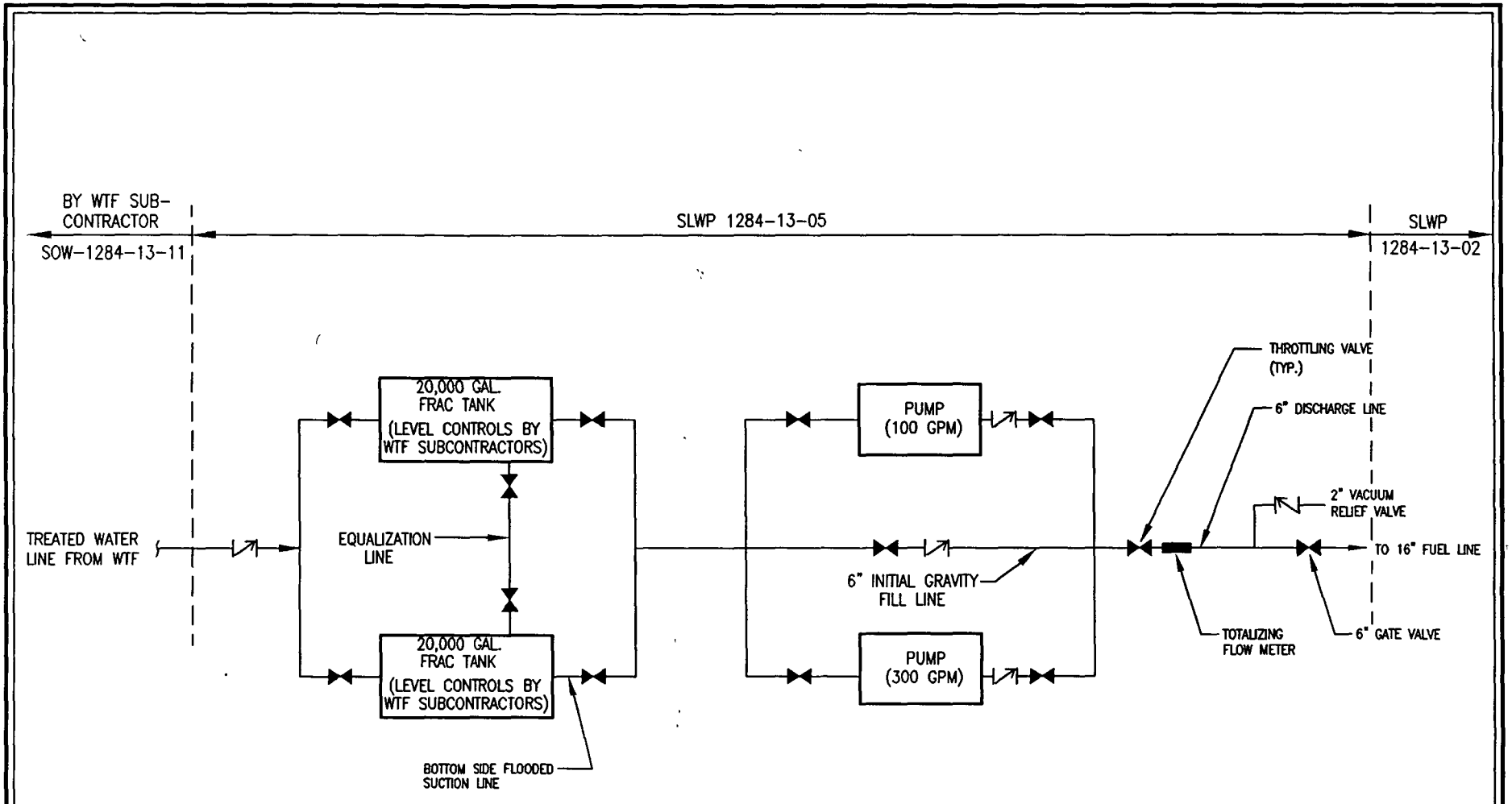


FIGURE 4-1

Naval Education and Training Center
Newport, Rhode Island

EFFLUENT PUMP LAYOUT

NOT TO SCALE	PROJ. NO. 1284.0013.0103

EFF-PUMP.DWG
6/4/96

Two effluent pumps will be installed on the WFT pad. One effluent pump will have a flow rate of 100 gpm and the other a flow rate of 300 gpm. Both pumps will be V-belt driven, mounted on I-beam skids, and placed within a 6-foot by 6-foot aboveground enclosure. Power to these pumps will be supplied by the Subcontractor in accordance with SOW-1284-13-06. Utilization of belt driven pumps will allow initial field adjustment to provide the desired flow rate with the associated throttling valve in approximately 75 percent open position. Following this initial startup, the flow rate of each pumps will be manually controlled with a throttling valve and monitored with a totalizing flow meter.

Treated effluent from two frac tanks at the WTF will be discharged to the existing on-site 16-inch fuel line at CT Chamber A-10 via a new 6-inch above-ground pipe. A new 6-inch above-ground pipe (approximately 600 LF) will also be installed to discharge treated water from the 16-inch fuel line in the CT chamber A-19 at Tank Farm No. 5 to an existing manhole discharging into the gravity sewer line. The gravity sewer line discharges sanitary wastewater to the City of Newport POTW via the Navy lift station near Tank Farm No. 5. Continuous discharge of treated effluent is required to support the tank closure activities. The treated effluent discharge schedule is as follows:

- Weekdays 0600-1800 : 100 gpm
- Weekdays 1800-0600 : 300 gpm
- Weekends and holidays : 300 gpm
- Average daily discharge weekdays : 288,000 gals.
- Average daily discharge weekends and holidays : 432,000 gals.

The ground elevations at and distances between various locations for the discharge line are as follows:

- Frac tanks : 65-foot el.
- Discharge pipe length between frac tanks and tie-in point : 2,700 LF
- Tie-in point on 16-inch fuel line at Defense Highway : 20-foot el.
- 16-inch fuel line length between tie-in point and A-19: 6,600 LF
- Chamber A-19: 60-foot el.
- Sewer pipe length between A-19 and gravity manhole: 600 LF
- Gravity sewer manhole: 70-foot el.

4.2 System Design

Two effluent pumps (one - 100 gpm and one - 300 gpm) with 50-foot discharge head will be connected to two frac tanks. A totalizing flow meter will be installed on the 6-inch discharge pipe down stream of the throttling globe valve. A vacuum relief valve will also be installed after the totalizing flow meter in order to protect the pipe and flow meter. A gate or ball valve will be installed on the 6-inch discharge pipe at the tie-in point to isolate the new pipe sections. The tie-in location and the discharge pipe layout are depicted in the Site Utilities Layout and Details (Dwg. No. 1284.0013.C3):

- Head loss in 6-inch pipe at 300 gpm : 0.6 feet/100 feet, @ 3300 LF, head loss = 19.8 feet
- Head loss in 16-inch pipe at 300 gpm : Negligible
- Head loss in pipes and fittings @ 20% of head loss in pipe = 5 feet

- Static lift = 70-foot el. - 65-foot el. = 5 feet
- Total system head loss = 30 feet

4.3 Water Treatment System Details and Material Requirements

The procurement and installation of the frac tank, pumps, hoses, pump enclosures, fittings and associated equipment will be completed by Foster Wheeler Environmental construction personnel.

The manufacturer's specifications for pipe, valves, and pumps are included in Appendix A. Details of the planned pumping system are as follows:

- 2 - Frac tanks (20,000 gallons each)
- 2 - Centrifugal pumps (100 and 300 gpm), Gorman-Rupp Model T3A3-B or equal
- 100 LF of 6-inch PVC pipe
- 13 - PVC gate or ball valve, 200 psi
- 1 - PVC (throttling) globe valve
- 4 - Check valves
- 1 - Totalizing flow meter
- 1 - Vacuum relief valve

Sufficient spare parts will be maintained on-site to ensure a continuous capability to discharge at the maximum allowable flow rate.

4.4 Installation Requirements

The frac tanks, totalizing flow meter, pumps and associated pipe, valves and fittings will be installed under the supervision of the Foster Wheeler Environmental Construction Superintendent or his designee. The Construction Superintendent and crew will be responsible for proper installation of the pumping system in accordance with the manufacturer's written guidelines.

4.5 Installation Procedure

The following is a general installation procedure for the temporary sewer line.

Materials delivered to site will be inspected for damage, unloaded and stored with minimum handling. Materials will be stored on-site in enclosures or under protective covering. Rubber gaskets will be stored under cover out of direct sunlight. No materials will be stored directly on the ground. Inside of pipes, fittings, and valves will be kept free of dirt and debris. Pipe will be carried into position and not dragged. Use of pinch bars and tongs for aligning or turning pipe will be permitted only on the bare ends of the pipe. The interior of pipe and accessories will be thoroughly cleaned of foreign matter and will be kept clean during laying operations by plugging or another approved method. Before installation, the pipe will be inspected for defects. Rubber gaskets that are not to be installed immediately will be stored in a cool and dark place.

Polyvinyl Chloride (PVC), pipe and fittings will be handled and stored in accordance with the manufacturer's recommendations. Maximum offset in alignment between adjacent pipe joints

will be as recommended by the manufacturer, but in no case will it exceeded 5 degrees. Connections between different types of pipe and accessories will be made with transition fittings.

After delivery, valves will be drained to prevent freezing and will have the interiors cleaned of all foreign matter before installation. Valves will be fully opened and fully closed to ensure that all parts are in working condition.

Plugs, caps, tees and bends deflecting 11¼ degrees or more, either vertically or horizontally, on lines 4 inches in diameter or larger will be provided with thrust restraints. Valves will be securely anchored or will be provided with thrust restraints to prevent movement. Thrust restraints will be either thrust blocks or restrained joints.

Restrained joints and push-on joints with elastomeric gaskets will be as designed by the pipe manufacturer. For pipe-to-pipe push-on joint connections, only pipe with push-on joint ends having factory-made bevel will be used. An approved lubricant recommended by the pipe manufacturer for push-on joints will be used. Push-on joints for pipe-to-pipe joint connections will be assembled in accordance with the requirements of the manufacturer for laying the pipe and for pipe joint assembly. Push-on joints for connection to fittings, valves and other accessories will be assembled in accordance with the requirements. Pumps and associated fittings will be installed in accordance with manufacturer's instructions.

4.6 Testing Requirements

The installed pumping system will be tested as described below:

After the pump and piping system installation is completed, the system will, unless otherwise specified, be subjected for 1 hour to a normal working pressure. Each valve will be opened and closed several times during the test. Exposed pipe, joints, fittings, and valves will be carefully examined during the test. Joints showing visible leakage will be replaced or remade as necessary. Cracked or defective pipe, joints, fittings, and valves discovered in consequence of this pressure test will be removed and replaced with sound material, and the test will be repeated until the test results are satisfactory.

APPENDIX A

MANUFACTURER'S SPECIFICATIONS

D

Self Priming Centrifugal Pump

Basic Pedestal

Model T3A3-B

Size 3" x 3"

GORMAN-RUPP

PUMP SPECIFICATIONS

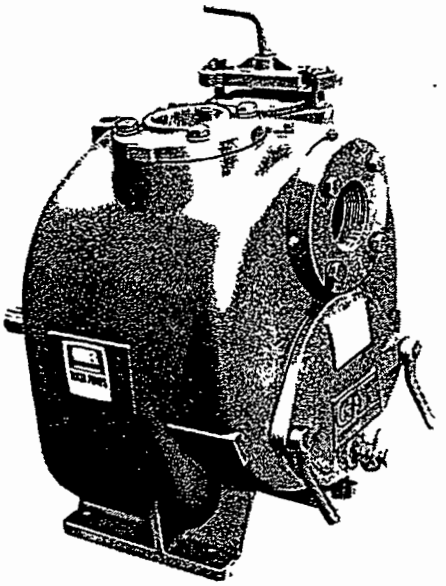
Size: 3" [76,2 mm] x 3" [76,2 mm] N.P.T.-Female
Casing: Gray Iron No. 30
(Maximum Operating Pressure 90 psi. [620 kPa])
Impeller: Open Type, Two Vanes, Ductile Iron No. 60-40-18
(Handles 2 1/2" [63,5 mm] Dia. Spherical Solids)
Impeller Shaft: Alloy Steel No. 4140
Wear Plate-Replaceable: Steel No. 1020
Cover Plate-Removable: Gray Iron No. 30 (30 lbs. [14 KG.])
Bearing Housing: Gray Iron No. 30
Seal Plate: Gray Iron No. 30
Flap Valve: Neoprene
Shaft Sleeve: Alloy Steel No. 4130
Radial Bearing: Open Ball
Thrust Bearing: Open Ball with Snap Ring
Bearing Lubrication: Oil
Flanges: Gray Iron No. 30
Gaskets: Compressed Synthetic Fibers, Red Rubber and Teflon
O-Rings: Buna-N
Hardware: Standard Plated Steel

Standard Equipment:

Oil Level Sight Gauge
Pressure Relief Valve: Brass

Optional Equipment:

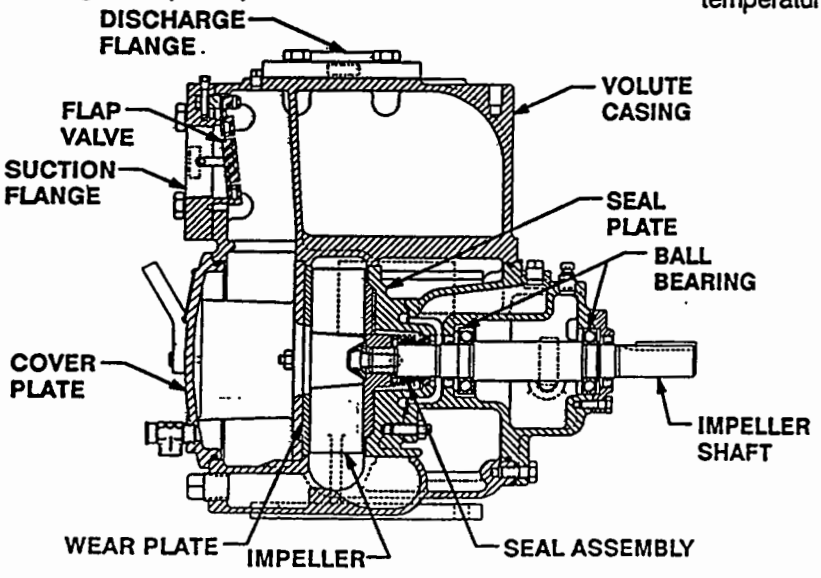
Pressure Relief Valve: Stainless Steel No. 316
Air Release Valve: Gray Iron No. 30
Suction and Discharge Flanged Spool:
Gray Iron No. 30
Casing Heater: 120V or 240V
High Pump Temperature Shutdown

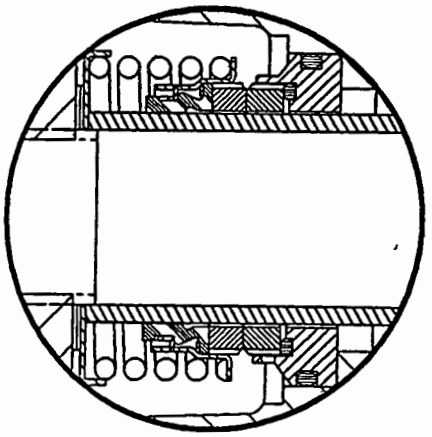


SEAL MODEL T3A3-B

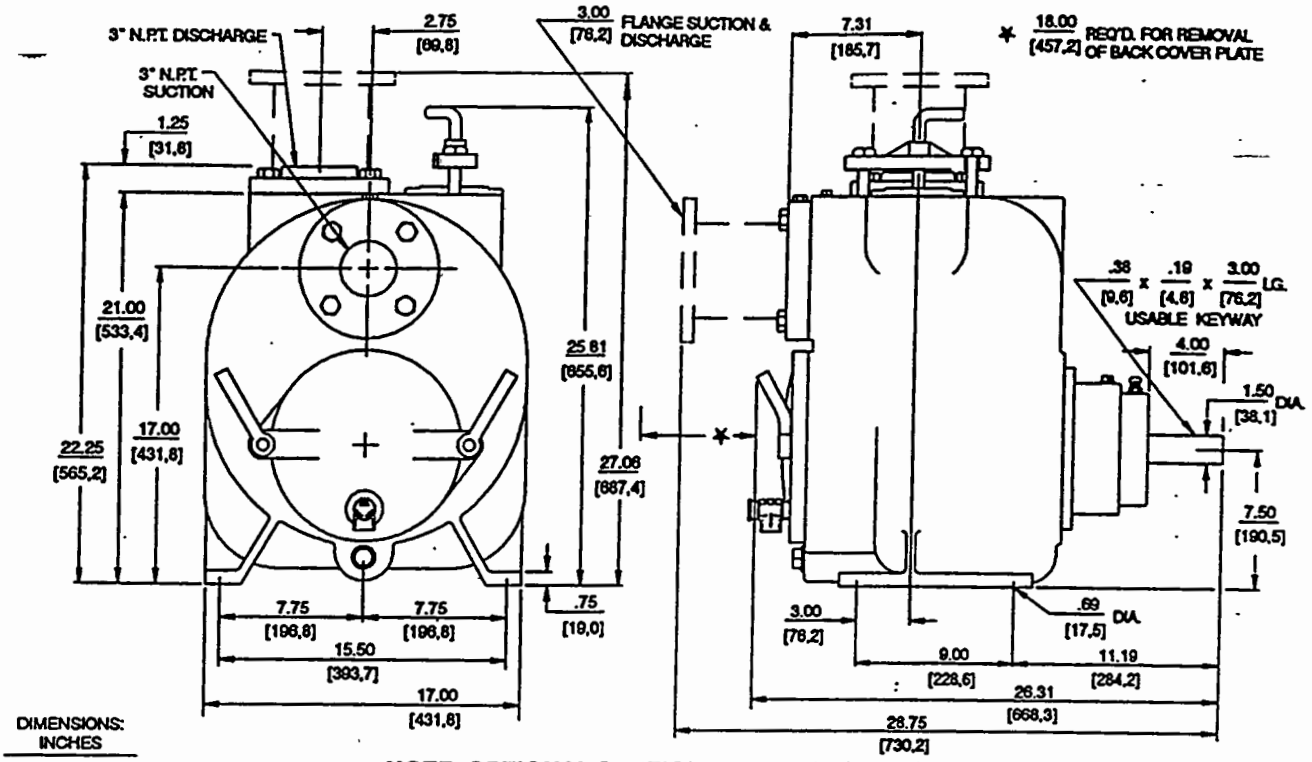
Mechanical Oil-Lubricated Double Floating Self-Aligning. Rotating and Stationary Faces are Tungsten Titanium Carbide. Stationary Seat is Stainless Steel No. 316. Elastomers are Viton. Cage and Spring are Stainless Steel No. 18-8. Maximum Temperature of Liquid Pumped, 160°F [71°C]*.

* Consult Factory for applications with liquids in excess of temperature indicated.





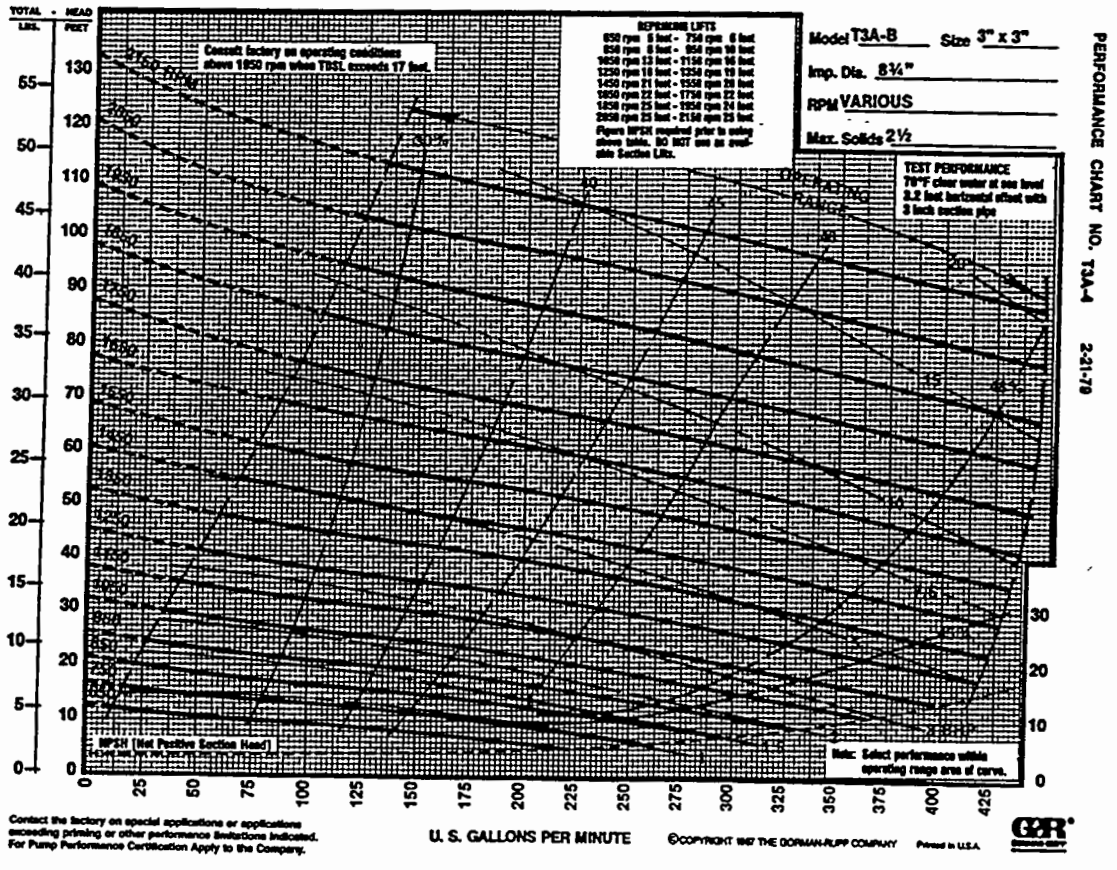
Specification Data	OVERALL DIMENSIONS and WEIGHTS APPROXIMATE	NET WEIGHT: 404 LBS. [183 KG.]
SECTION 55, PAGE 1000		SHIPPING WEIGHTS: 452 LBS. [205 KG.]
		EXPORT CRATE: 12.7 CU. FT. [.36 CU. M.]



DIMENSIONS: INCHES / [MILLIMETERS]

NOTE: OPTIONAL SUCTION & DISCHARGE SPOOLS AVAILABLE

100



Contact the factory on special applications or applications exceeding priming or other performance limitations indicated. For Pump Performance Certification Apply to the Company.

 Printed in U.S.A.

THE GORMAN-RUPP COMPANY MANSFIELD, OHIO
GORMAN-RUPP OF CANADA LIMITED • ST. THOMAS, ONTARIO, CANADA
Printed in U.S.A.

Self Priming Centrifugal Pump

Basic Pedestal

Model T3A24-B

Size 3" x 3"

GORMAN-RUPP

PUMP SPECIFICATIONS

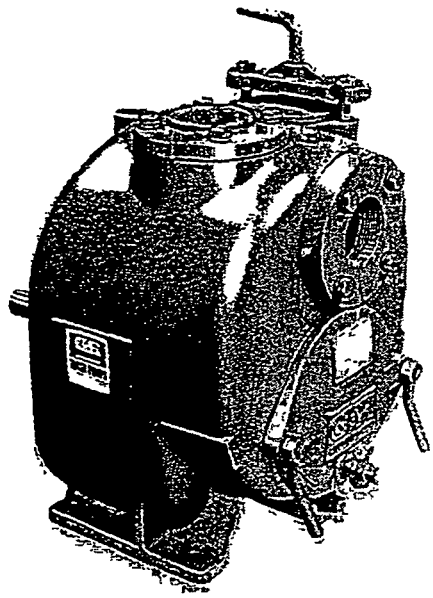
Size: 3" [76,2 mm] x 3" [76,2 mm] N.P.T.-Female
Casing: Gray Iron No. 30
(Maximum Operating Pressure 90 psi. [620 kPa])
Impeller: Open Type, Two Vanes, Stainless Steel No. 316
(Handles 2 1/2" [63,5 mm] Dia. Spherical Solids)
Impeller Shaft: Stainless Steel No. 17-4 PH
Wear Plate-Replaceable: Stainless Steel No. 316
Cover Plate-Removable: Gray Iron No. 30 (30 lbs. [14 KG.])
Bearing Housing: Gray Iron No. 30
Seal Plate: Stainless Steel No. 316
Flap Valve: Neoprene
Radial Bearing: Open Ball
Thrust Bearing: Open Ball with Snap Ring
Bearing Lubrication: Oil
Flanges: Gray Iron No. 30
Gaskets: Compressed Synthetic Fibers and Teflon
O-Rings: Buna-N
Hardware-Internal Wetted: Stainless Steel No. 316
Hardware-External: Standard Plated Steel

Standard Equipment:

Oil Level Sight Gauge
Pressure Relief Valve: Stainless Steel No. 316

Optional Equipment:

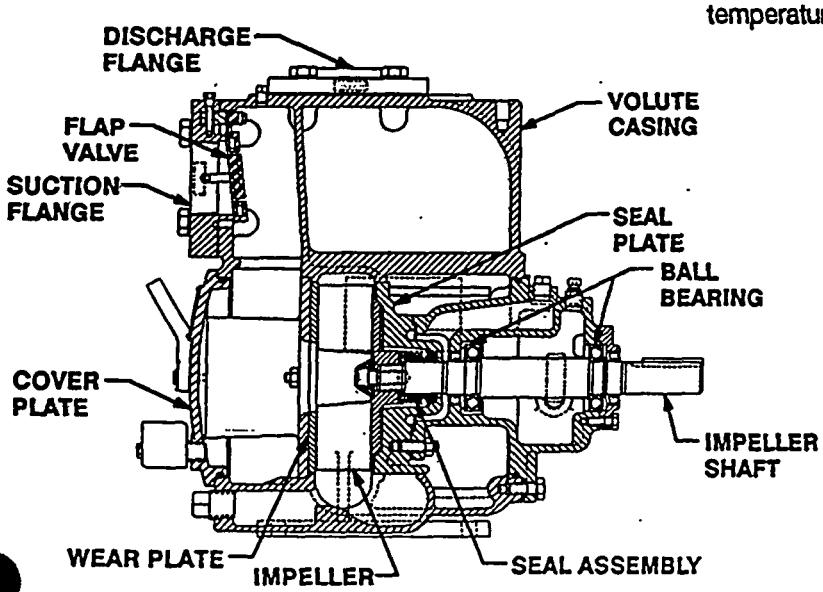
Air Release Valve: Gray Iron No. 30
Suction and Discharge Flanged Spool:
Gray Iron No. 30
Casing Heater: 120V or 240V
High Pump Temperature Shutdown

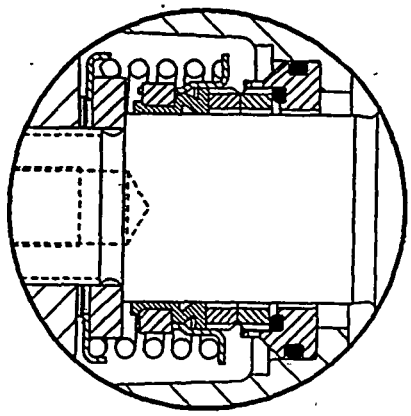


SEAL MODEL T3A24-B

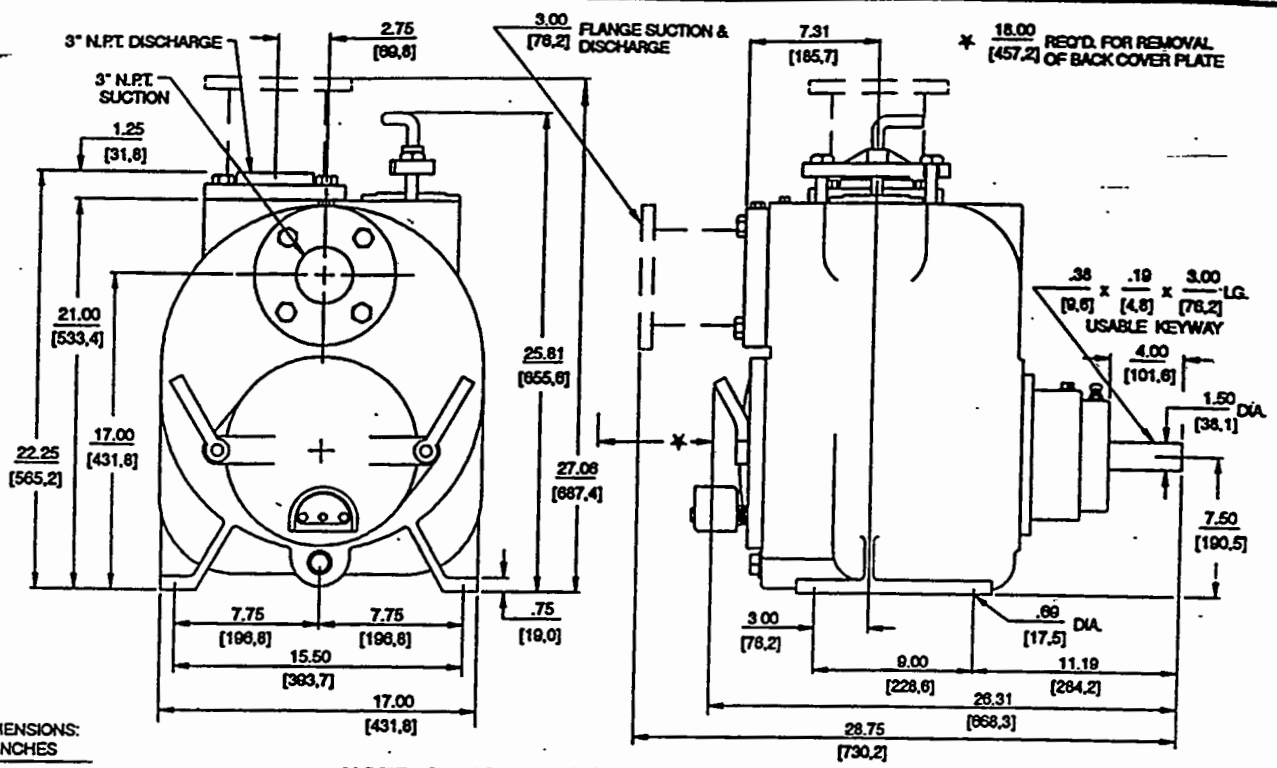
Mechanical Oil-Lubricated Double Floating Self-Aligning. Rotating and Stationary Faces are Tungsten Titanium Carbide. Stationary Seat is Stainless Steel No. 316. Elastomers are Viton. Cage and Spring are Stainless Steel No. 18-8. Maximum Temperature of Liquid Pumped, 160°F [71°C]*.

* Consult Factory for applications with liquids in excess of temperature indicated.



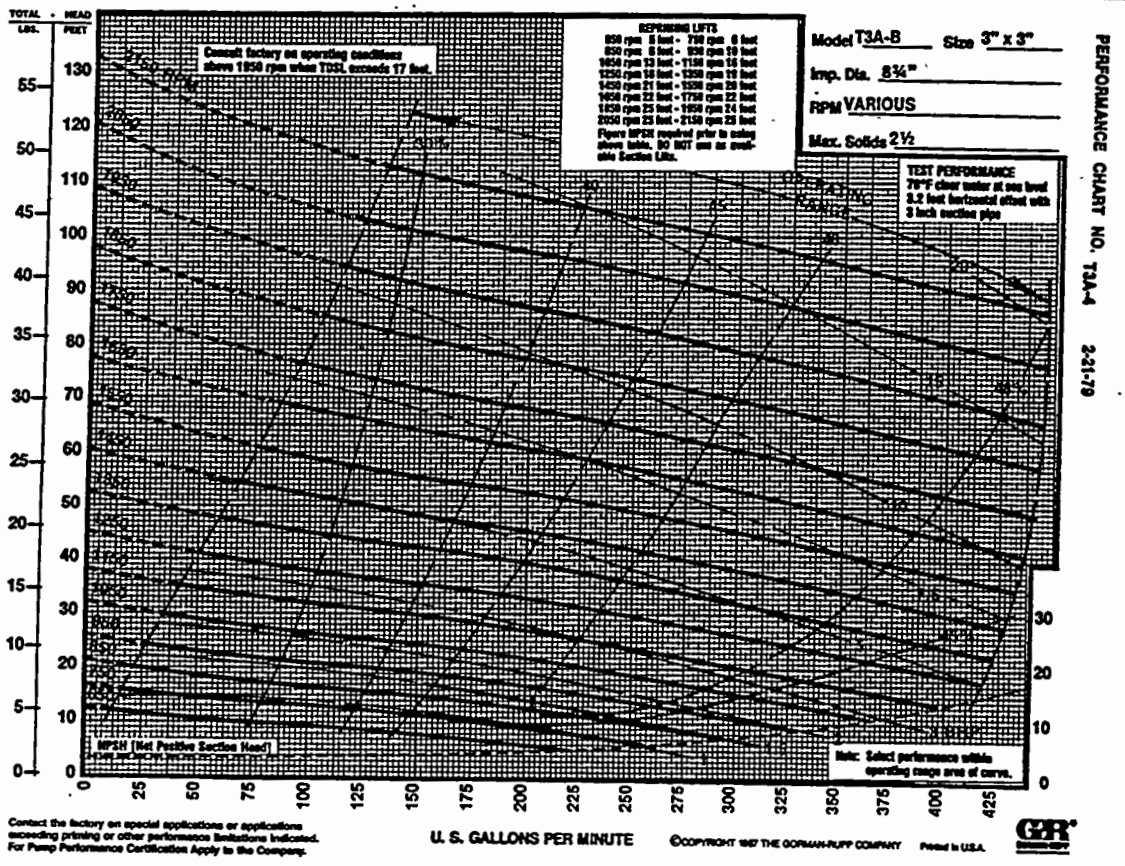


Specification Data	OVERALL DIMENSIONS and WEIGHTS APPROXIMATE	NET WEIGHT: 444 LBS. [201 KG.]
SECTION 55, PAGE 1025		SHIPPING WEIGHTS: 454 LBS. [206 KG.]
		EXPORT CRATE: 12.7 CU. FT. [.36 CU. M.]



DIMENSIONS: INCHES [MILLIMETERS]

NOTE: OPTIONAL SUCTION & DISCHARGE SPOOLS AVAILABLE



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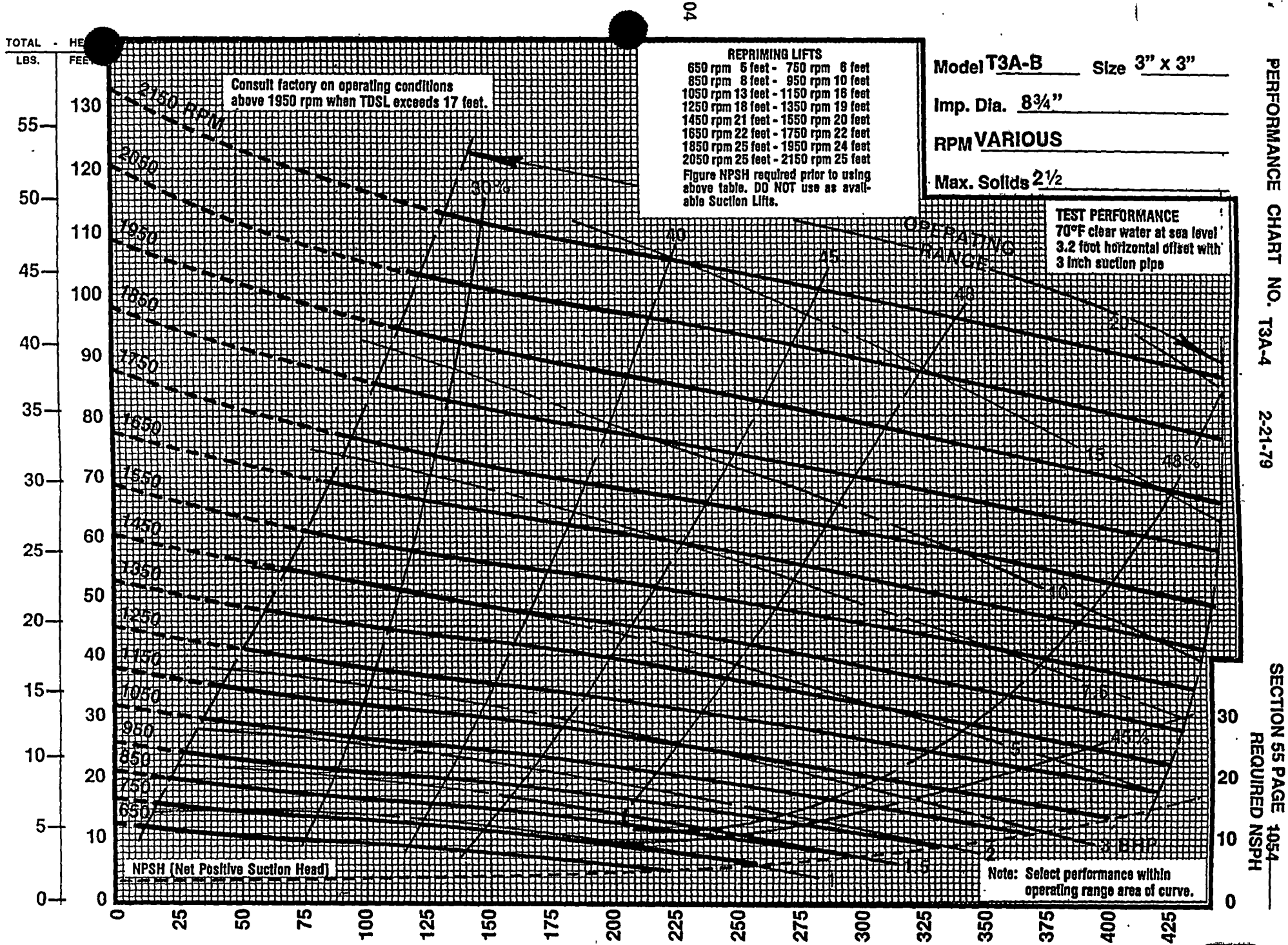
T3A3-B

"V" BELT DATA SHEET		MOTOR SPEED 1750 RPM				BASE 11539 - MOTOR ON RIGHT - FACING PUMP SUCTION BASE 11540 - MOTOR ON LEFT - FACING PUMP SUCTION			
DRIVEN SPEED	SPEED RATIO	1 H.P.	2 H.P.	3 H.P.	5 H.P.	7½ H.P.	10 H.P.	15 H.P.	20 H.P.
2150	1.228					O.D. 5.3 & 6.5 C.D. 20.7 2-3V600	O.D. 6.5 & 8.0 C.D. 20.1 2-3V630	O.D. 6.5 & 8.0 C.D. 20.1 3-3V630	O.D. 6.5 & 8.0 C.D. 20.1 4-3V630
2100	1.20					O.D. 5.0 & 6.0 C.D. 21.4 2-3V600	O.D. 5.0 & 6.0 C.D. 21.4 3-3V600	O.D. 5.0 & 6.0 C.D. 21.4 4-3V600	O.D. 5.0 & 6.0 C.D. 21.4 5-3V600
2050	1.17					O.D. 5.6 & 6.5 C.D. 20.5 2-3V600	O.D. 5.6 & 6.5 C.D. 20.5 3-3V600	O.D. 5.6 & 6.5 C.D. 20.5 4-3V600	O.D. 5.6 & 6.5 C.D. 20.5 5-3V600
2000	1.14					O.D. 6.0 & 6.9 C.D. 21.4 2-3V630	O.D. 6.0 & 6.9 C.D. 21.4 2-3V630	O.D. 6.0 & 6.9 C.D. 21.4 3-3V630	
1950	1.11					O.D. 5.0 & 5.6 C.D. 21.7 2-3V600	O.D. 5.0 & 5.6 C.D. 21.7 3-3V600	O.D. 5.0 & 5.6 C.D. 21.7 4-3V600	
1900	1.085				O.D. 6.0 & 6.5 C.D. 20.2 2-3V600	O.D. 6.0 & 6.5 C.D. 20.2 2-3V600	O.D. 6.0 & 6.5 C.D. 20.2 2-3V600	O.D. 6.0 & 6.5 C.D. 20.2 3-3V600	
1850	1.057				O.D. 6.5 & 6.9 C.D. 21.0 2-3V630	O.D. 6.5 & 6.9 C.D. 21.0 2-3V630	O.D. 6.5 & 6.9 C.D. 21.0 2-3V630	O.D. 6.5 & 6.9 C.D. 21.0 3-3V630	
1800	1.028				O.D. 4.75 & 5.0 C.D. 20.3 2-3V560	O.D. 4.75 & 5.0 C.D. 20.3 3-3V560	O.D. 4.75 & 5.0 C.D. 20.3 3-3V560	O.D. 4.75 & 5.0 C.D. 20.3 5-3V560	
1750	1.0				O.D. 5.0 & 5.0 C.D. 20.2 2-3V560	O.D. 5.0 & 5.0 C.D. 20.2 2-3V560	O.D. 5.0 & 5.0 C.D. 20.2 3-3V560	O.D. 5.0 & 5.0 C.D. 20.2 4-3V560	
1700	1.029				O.D. 4.75 & 5.0 C.D. 20.3 2-3V560	O.D. 4.75 & 5.0 C.D. 20.3 3-3V560	O.D. 4.75 & 5.0 C.D. 20.3 3-3V560		
1650	1.06				O.D. 6.5 & 6.9 C.D. 21.0 2-3V630	O.D. 6.5 & 6.9 C.D. 21.0 2-3V630	O.D. 6.5 & 6.9 C.D. 21.0 2-3V630		
1600	1.093				O.D. 4.12 & 4.5 C.D. 21.2 2-3V560	O.D. 4.12 & 4.5 C.D. 21.2 3-3V560	O.D. 4.12 & 4.5 C.D. 21.2 4-3V560		
1550	1.129			O.D. 5.3 & 6.0 C.D. 21.1 2-3V600	O.D. 5.3 & 6.0 C.D. 21.1 2-3V600	O.D. 5.3 & 6.0 C.D. 21.1 2-3V600			
1500	1.16			O.D. 5.6 & 6.5 C.D. 20.5 2-3V600	O.D. 5.6 & 6.5 C.D. 20.5 2-3V600	O.D. 5.6 & 6.5 C.D. 20.5 2-3V600			
1450	1.20			O.D. 5.0 & 6.0 C.D. 21.4 2-3V600	O.D. 5.0 & 6.0 C.D. 21.4 2-3V600	O.D. 5.0 & 6.0 C.D. 21.4 2-3V600			
1400	1.25			O.D. 4.5 & 5.5 C.D. 20.1 2-3V560	O.D. 4.5 & 5.6 C.D. 20.1 2-3V560	O.D. 4.5 & 5.6 C.D. 20.1 3-3V560			
1350	1.296			O.D. 4.12 & 5.3 C.D. 20.6 2-3V560	O.D. 4.12 & 5.3 C.D. 20.6 2-3V560				
1300	1.346		O.D. 4.5 & 6.0 C.D. 21.7 2-3V600	O.D. 4.5 & 6.0 C.D. 21.7 2-3V600	O.D. 4.5 & 6.0 C.D. 21.7 2-3V600				
1250	1.4		O.D. 3.65 & 5.0 C.D. 21.2 2-3V560	O.D. 3.65 & 5.0 C.D. 21.2 2-3V560	O.D. 3.65 & 5.0 C.D. 21.2 2-3V560				
1200	1.458		O.D. 4.12 & 6.0 C.D. 20.0 2-3V560	O.D. 4.12 & 6.0 C.D. 20.0 2-3V560	O.D. 4.12 & 6.0 C.D. 20.0 2-3V560				
1150	1.52		O.D. 3.15 & 4.75 C.D. 21.8 2-3V560	O.D. 3.15 & 4.75 C.D. 21.8 2-3V560	O.D. 3.15 & 4.75 C.D. 21.8 3-3V560				
1100	1.59	O.D. 3.35 & 5.3 C.D. 21.2 2-3V560	O.D. 3.35 & 5.3 C.D. 21.2 2-3V560			INSTALL SMALLER DIAMETER SHEAVE ON HIGHER SPEED UNIT, MOTOR OR PUMP			
1050	1.66	O.D. 3.65 & 6.0 C.D. 20.4 2-3V560	O.D. 3.65 & 6.0 C.D. 20.4 2-3V560						
1000	1.75	O.D. 2.8 & 4.75 C.D. 20.6 2-3V530							
950	1.84	O.D. 3.0 & 5.6 C.D. 21.2 2-3V560							
900	1.94	O.D. 3.15 & 6.0 C.D. 20.8 2-3V560							
850	2.058	O.D. 3.0 & 6.0 C.D. 20.9 2-3V560							

103

HORIZONTAL BELT DRIVES ONLY.
NOT APPLICABLE ON VERTICAL V-BELT APPLICATIONS.



PERFORMANCE CHART NO. T3A-4 2-21-79

SECTION 55 PAGE 1054 REQUIRED NSPH

Contact the factory on special applications or applications exceeding priming or other performance limitations indicated. For Pump Performance Certification Apply to the Company.

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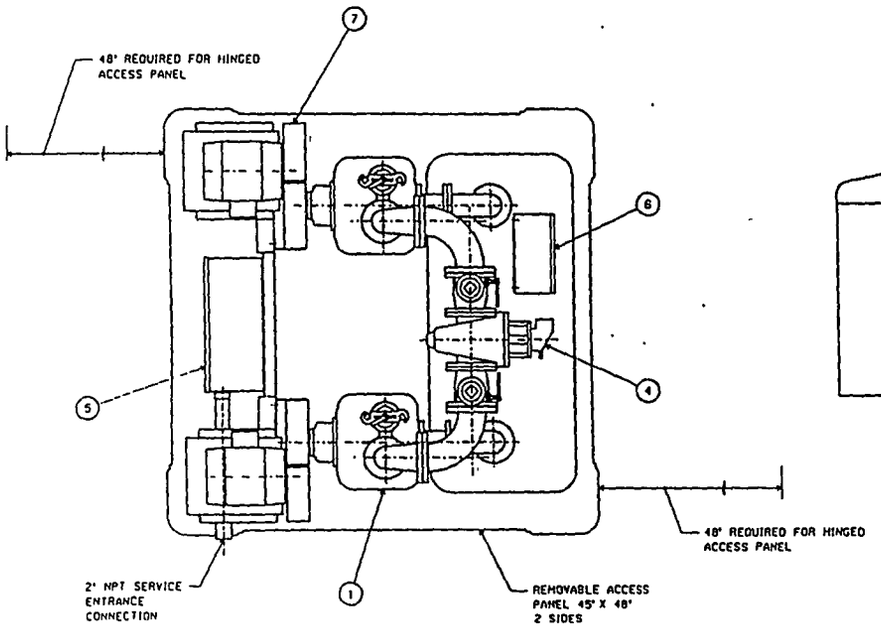
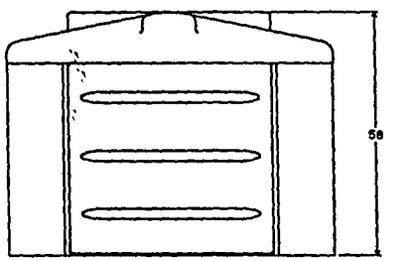
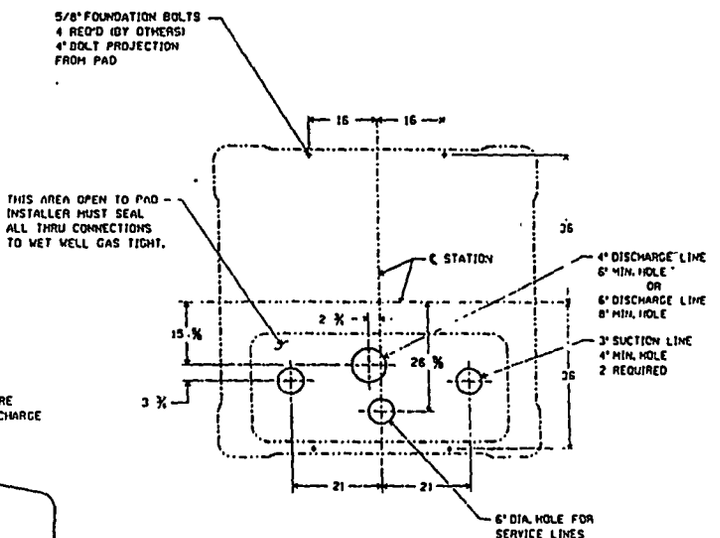


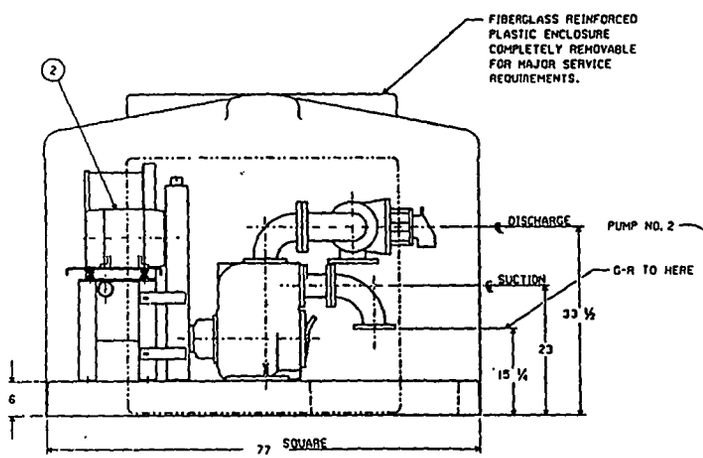


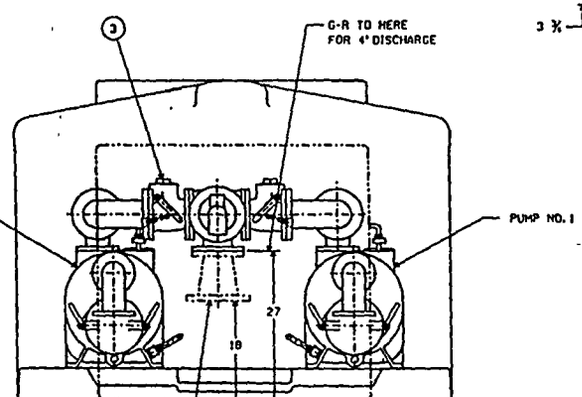
ELEVATION VIEW

ITEM	DESCRIPTION	MATL & SIZE
1	PUMP	CAST IRON T3A3-B
2	MOTOR	CAST IRON
3	CHECK VALVE	CAST IRON 4"
4	PLUG VALVE	CAST IRON 4"
5	MOTOR CONTROL PANEL	STEEL
6	LIQUID LEVEL PANEL	STEEL
7	BELTGUARD	STEEL



PLAN VIEW





NOTE: CUSTOMER SUCTION AND DISCHARGE CONNECTIONS ARE 125# FLANGE

3 X 4 X 4 AS SHOWN
3 X 4 X 6 WITH INCREASER

45113013.DGN

THE GORMAN-RUPP CO.

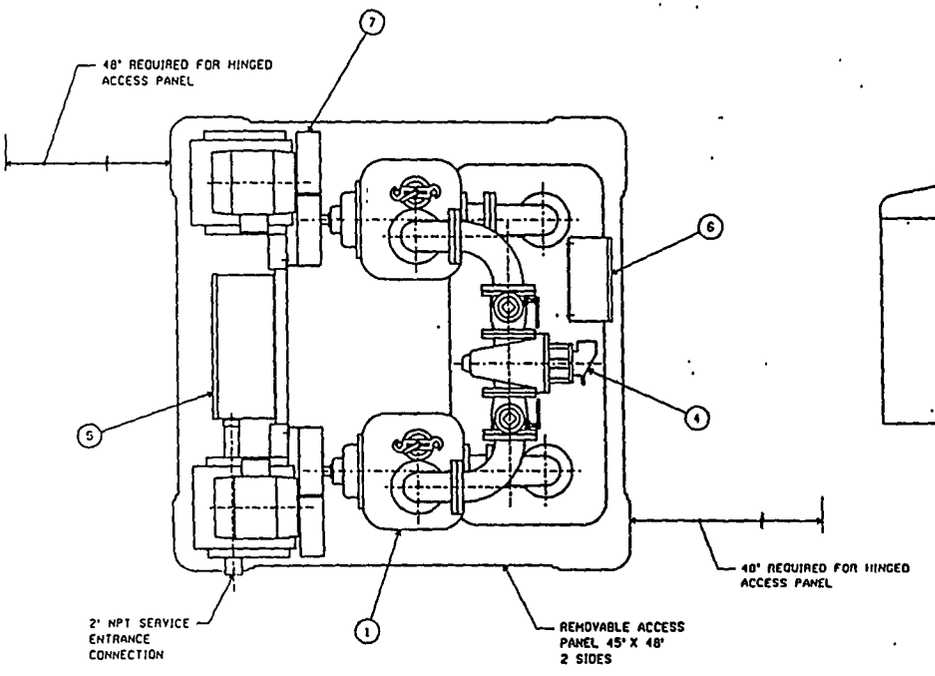
6" X 6" ABOVEGROUND SEWAGE LIFT STATION W/DUPLEX T3A3-B PUMPS

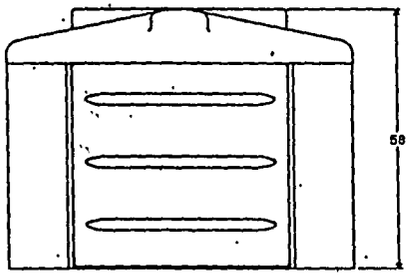
DRN.	CHK.	APP.	DATE
BM	KEH	PFB	3/18/75

D 45113-013

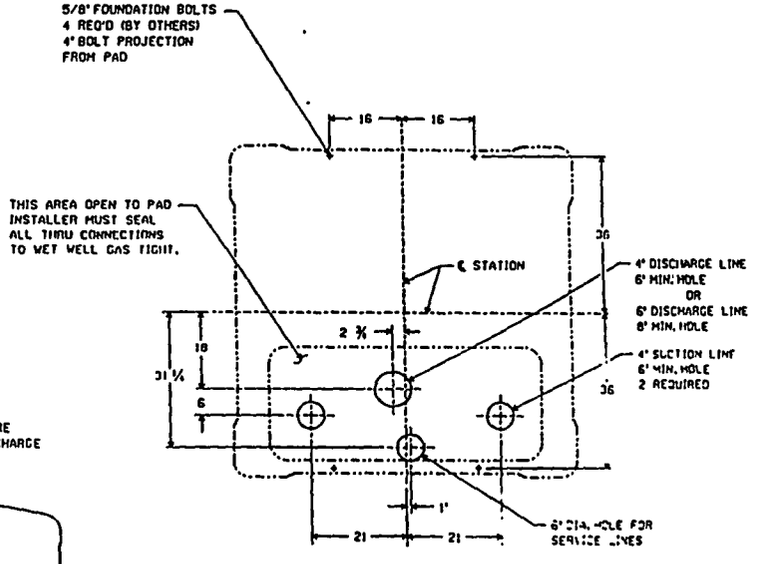
WL-02989

ITEM	DESCRIPTION	MAT'L & SIZE	
1	PUMP	CAST IRON	T4A3-B
2	MOTOR	CAST IRON	
3	CHECK VALVE	CAST IRON	4"
4	PLUG VALVE	CAST IRON	4"
5	MOTOR CONTROL PANEL	STEEL	
6	LIQUID LEVEL PANEL	STEEL	
7	BELTGUARD	STEEL	

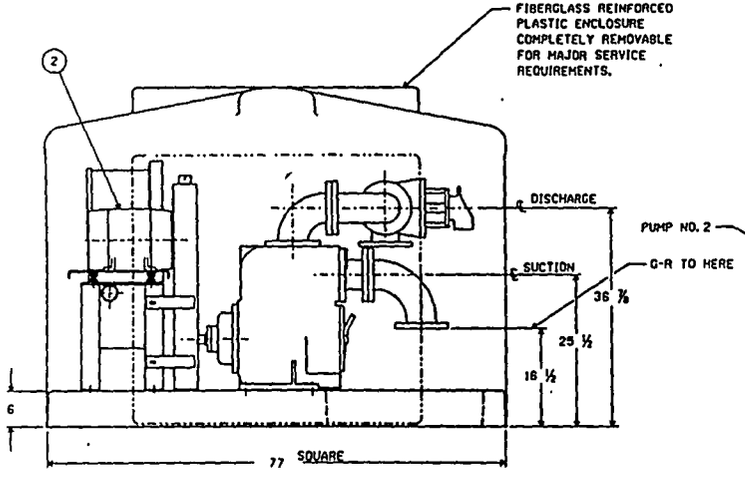


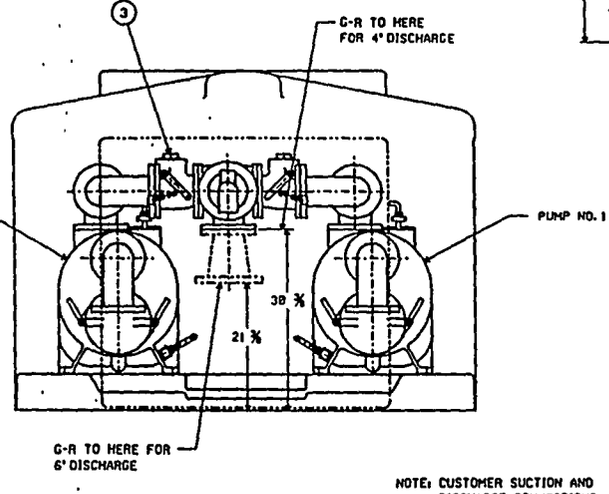


ELEVATION VIEW



PLAN VIEW





NOTE: CUSTOMER SUCTION AND DISCHARGE CONNECTIONS ARE 125# FLANGE

4 X 4 X 4 AS SHOWN
4 X 4 X 6 WITH INCREASER

45121887.DGN

THE GORMAN-RUPP CO.

NAME: 6" X 6" ABOVEGROUND SEWAGE LIFT STATION W/DUPLEX T4A3-B PUMPS

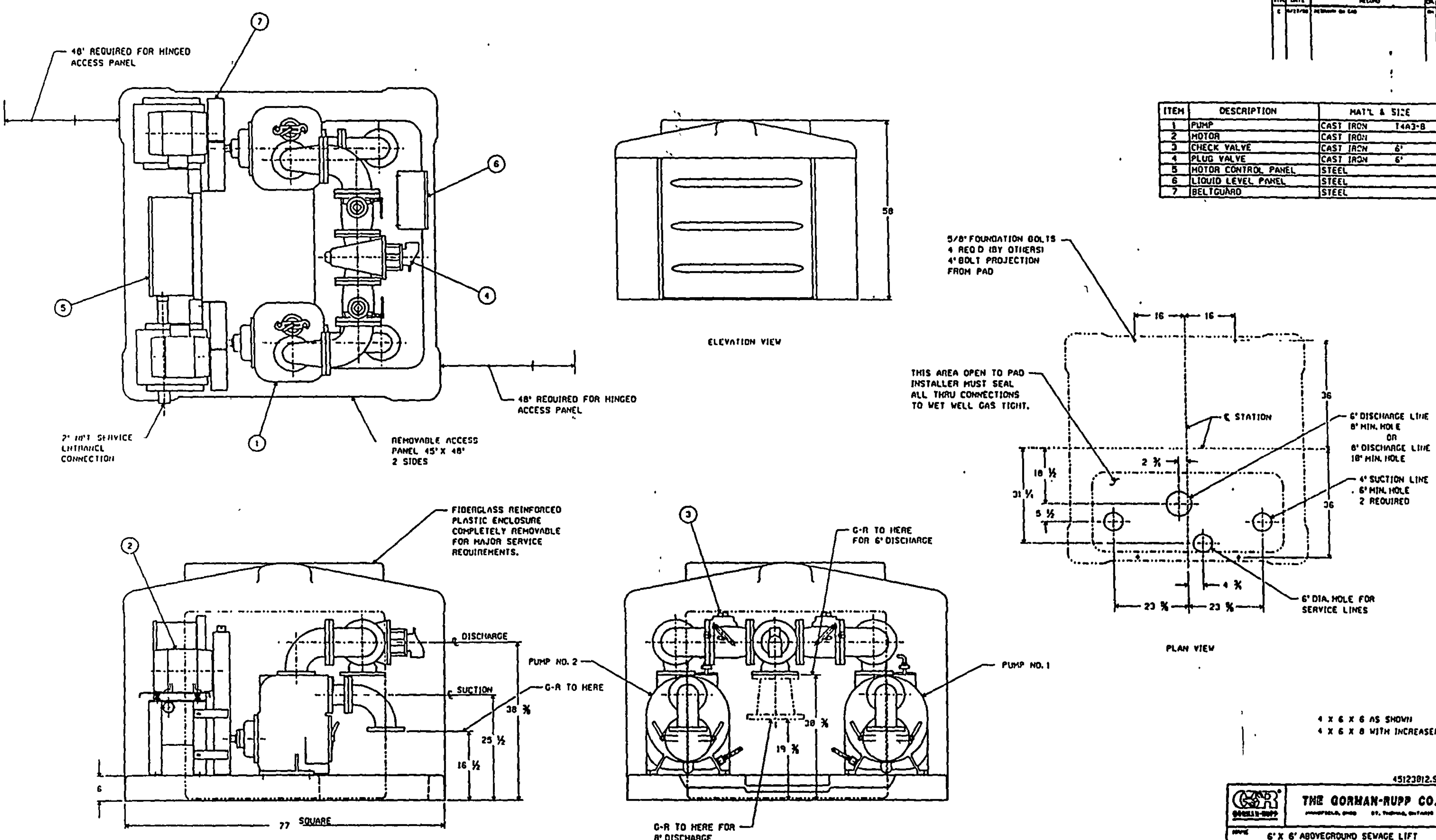
DRN.	CHK.	APP.	DATE
BM	KEH	PFB	3/24/75

SERIAL NO.

WL-02991

D | 45121-007

A8 of 22



ITEM	DESCRIPTION	MAT'L & SIZE	
1	PUMP	CAST IRON	T4A3-B
2	MOTOR	CAST IRON	
3	CHECK VALVE	CAST IRON	6"
4	PLUG VALVE	CAST IRON	6"
5	MOTOR CONTROL PANEL	STEEL	
6	LIQUID LEVEL PANEL	STEEL	
7	BELTGUARD	STEEL	

NOTE: CUSTOMER SUCTION AND DISCHARGE CONNECTIONS ARE 125# FLANGE

45123012.S01

THE GORMAN-RUPP CO.

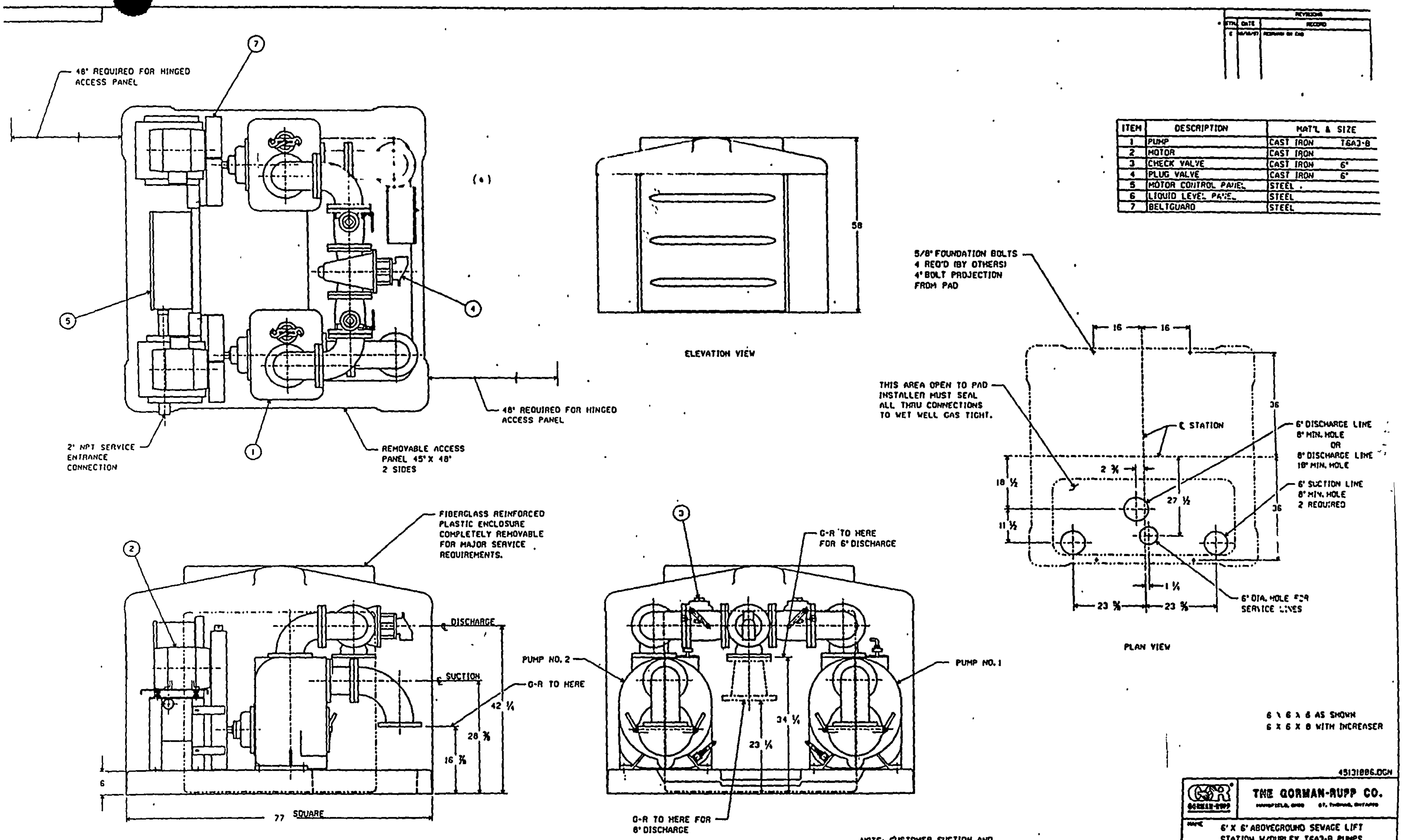
6" X 6" ABOVEGROUND SEWAGE LIFT STATION W/DUPLEX T4A3-B PUMPS

DRN. BM | CHK. KEH | APP. PFB | DATE 3/28/75

WL-02992

D 45123-012

A-9 of 22



ITEM	DESCRIPTION	MAT'L & SIZE	
1	PUMP	CAST IRON	T6A3-B
2	MOTOR	CAST IRON	
3	CHECK VALVE	CAST IRON	6"
4	PLUG VALVE	CAST IRON	6"
5	MOTOR CONTROL PANEL	STEEL	
6	LIQUID LEVEL PANEL	STEEL	
7	BELTGUARD	STEEL	

NOTE: CUSTOMER SUCTION AND DISCHARGE CONNECTIONS ARE 125# FLANGE

45131006.DGN

THE GORMAN-RUPP CO.

NAME: 6' X 6' ABOVEGROUND SEWAGE LIFT STATION W/DUPLEX T6A3-B PUMPS

DRN.	CHK.	APP.	DATE
BM	KEH	PFB	3/7/75

WL-02994

D 45131-006

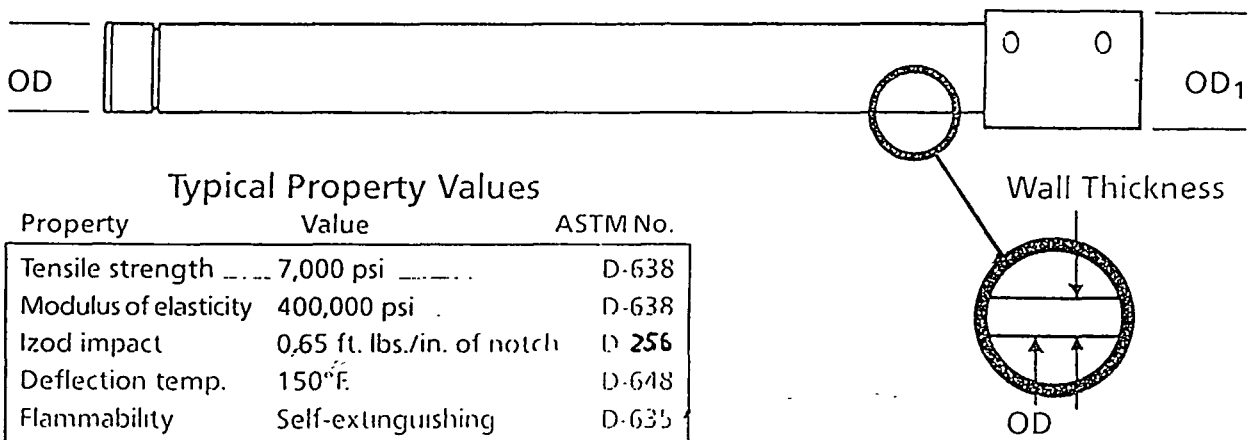
A10 of 22

Performance Characteristics And Specifications

PVC Pipe is made from a special formulation of Poly (Vinyl Chloride) Type 1, Grade 1 2000 psi design stress material, Class 12454B in accordance with ASTM D-1784. PVC formulation contains additional impact modifiers and ultraviolet inhibitors to give it higher impact strength over a longer period of time.

extruded to meet all PVC Pipe requirements as specified in the ASTM Standard Specification D-2241 for Poly (Vinyl Chloride) Plastic Pipe, (pressure rated SDR pipe). joints and couplings meet ASTM D3139 standards for Joints. For Plastic Pressure Pipes Using Flexible Elastomeric Seals. O-Rings meet ASTM F477, Standard Specification for Elastomeric Seals (Gaskets) for Joining PVC Pipe.

PVC Pipe has Potable Water Service Certification in accordance with NSF No. 14 (National Sanitation Foundation Standard) for Thermoplastic materials, pipe fittings, valves, traps and joining materials.

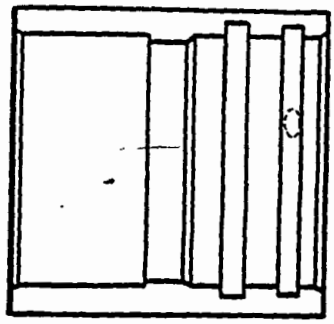


Typical Property Values

Property	Value	ASTM No.
Tensile strength	7,000 psi	D-638
Modulus of elasticity	400,000 psi	D-638
Izod impact	0.65 ft. lbs./in. of notch	D 256
Deflection temp.	150°F.	D-648
Flammability	Self-extinguishing	D-635
Chemical resistance	B	D-543

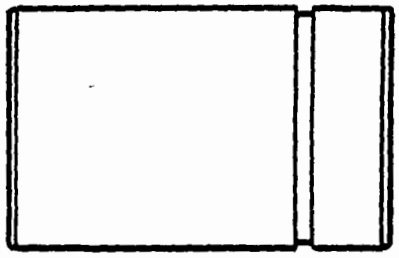
Size	O.D.		$O.D._1$		Class 160 Wall Thickness		Class 200 Wall Thickness		Class 250 Wall Thickness	
	in.	cm	in.	cm	in.	cm	in.	cm	in	cm
2"	2.375	6.033	3.200	8.128	--	--	.113	.287	140	356
3"	3.500	8.890	4.380	11.125	--	--	.167	.424	.206	.523
4"	4.500	11.430	5.470	13 894	173	.439	214	543	.265	673
→ 6"	6.625	16.828	7.840	19.914	.255	.648	.316	.803	390	.991
8"	8.625	21.908	10.190	25.883	332	.843	.410	1 04	--	--
10"	10.750	27.305	12.200	30 988	.511	1 300	--	--	--	--
12"	12.750	32.385	14.420	36 627	.606	1 539	--	--	--	--

Link x Glue Coupling



SIZE	DESCRIPTION	PSI RATING	PART NO.
2"	X GLUE COUPLING	250 PSI	2AGC20
3"	X GLUE COUPLING	250 PSI	3AGC21
4"	X GLUE COUPLING	250 PSI	4AGC22
6"	X GLUE COUPLING	250 PSI	6AGC23
8"	X GLUE COUPLING	200 PSI	8AGC24
10"	X GLUE COUPLING	160 PSI	10AGC25
12"	X GLUE COUPLING	160 PSI	12AGC26

Link Nipple Groove x Glue Ends



SIZE	DESCRIPTION	PSI RATING	PART NO.
2"	X GLUE NIPPLE	250 PSI	2AGN30
3"	X GLUE NIPPLE	250 PSI	3AGN31
4"	X GLUE NIPPLE	250 PSI	4AGN32
6"	X GLUE NIPPLE	250 PSI	6AGN33
8"	X GLUE NIPPLE	200 PSI	8AGN34
10"	X GLUE NIPPLE	160 PSI	10AGN35
12"	X GLUE NIPPLE	160 PSI	12AGN36

GATE VALVE

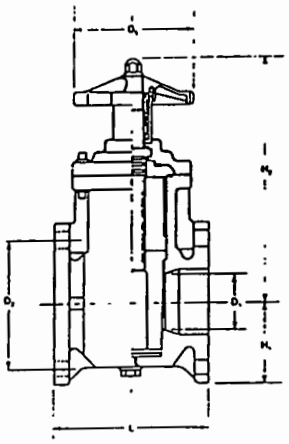
• Unique sliding plug design provides greater seating area than conventional gate valves • New plug and seat permits throttling and eliminates chatter • ANSI face-to-face dimensions on models through 8" • Non-rising stem with position indicator • Competitively priced with cast iron • Rated for full vacuum service

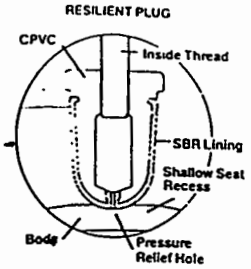
OPERATING PRESSURE VS. TEMPERATURE (PSI, WATER, NON-SHOCK)

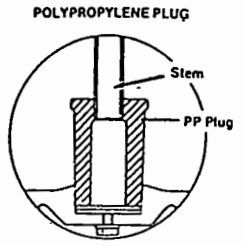
Size	30°F–120°F
1½"	150
2"	150
3"	150
4"	150
6"	150
8"	150
10"	110
12"	70
14"	70

SPECIFICATIONS

SIZE: 1½–14"
MODELS: Flanged (ANSI) Wafer Optional
BODY: PVC
PLUG: PP or CPVC-SBR lined
SEALS: EPDM



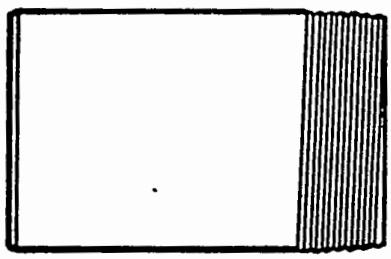




DIMENSIONS (IN INCHES)

Size	Weight (lbs.)	D_1	D_2	D_3	L	H_1	H_2	Cv Values
1½"	5.50	1.50	3.88	4.72	6.50	2.50	9.26	140
2"	7.50	1.77	4.75	5 12	7.00	3 00	10.15	230
3"	13.50	2.64	6.00	6.69	8 00	3 75	12.20	580
4"	20.00	3.46	7.50	7.68	9.00	4.50	13.78	1100
6"	40.10	5.12	9.50	10.63	10.50	5.50	17.52	2100
8"	66.20	6.61	11.75	12.20	11.50	6.75	22.72	3900
10"	115.80	8.27	14.25	14.17	14.96	8.00	27.17	6100
12"	146.70	10.04	17.00	16.14	15.75	9.50	31.50	8700
14"	187.40	11.69	18.75	17.91	16.93	10 50	35.82	12200

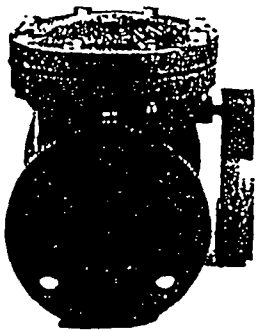
Nipple Plain Male x Male Pipe Thread

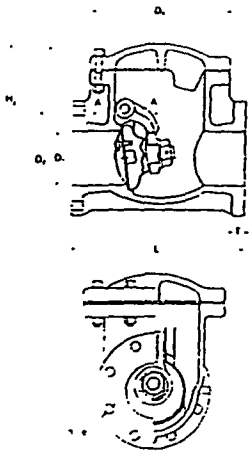


SIZE	DESCRIPTION	PSI RATING	PART NO.
2"	GLUE X THREADED NIPPLE	250 PSI	2TGN60
3"	GLUE X THREADED NIPPLE	250 PSI	3TGN61
4"	GLUE X THREADED NIPPLE	250 PSI	4TGN62
6"	GLUE X THREADED NIPPLE	250 PSI	6TGN63
8"	GLUE X THREADED NIPPLE	200 PSI	8TGN64
10"	GLUE X THREADED NIPPLE	160 PSI	10TGN65
12"	GLUE X THREADED NIPPLE	160 PSI	12TGN66

SWING CHECK VALVE

• Offers minimal flow resistance • May be installed in horizontal or vertical lines • Disc seats tightly • Top entry permits cleaning without removing valve from the line • Rated for full vacuum service • Optional external lever and weight or external spring to assist the disc in closing faster





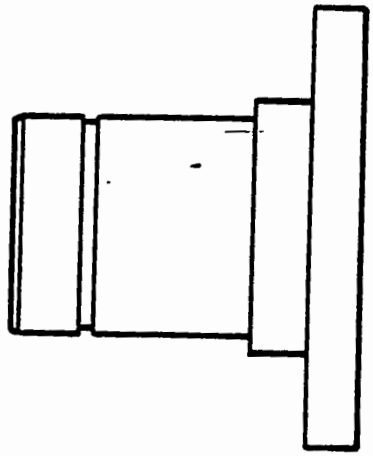
SPECIFICATIONS

SIZES: ¾"–8"
MODELS: Flanged (ANSI)
BODIES: PVC, PP, PVDF
SEATS: EPDM, Teflon®, VITON®
SEAL: EPDM, Teflon®, VITON®

Size	Weight (lbs.)	D_1	D_2	D_4	L	T	H_2
¾"	1.8	0.79	2.76	3.39	5.51	0.59	3.54
1"	3.6	0.98	3.13	5.12	6.30	0.63	4.72
1 ½"	6.0	1.57	3.88	5.71	7.09	0.71	5.43
2"	8.9	1.97	4.75	7.09	7.87	0.79	6.46
2 ½"	11.3	2.56	5.50	7.87	9.45	0.87	6.61
3"	12.2	3.15	6.00	8.07	10.24	0.87	6.73
4"	21.0	3.94	7.50	10.43	11.81	0.94	8.39
5"	36.1	4.92	8.50	12.99	13.78	0.94	9.76
6"	46.0	5.91	9.50	14.57	15.75	0.98	11.14
8"	75.2	7.87	11.75	16.73	19.69	1.18	13.23

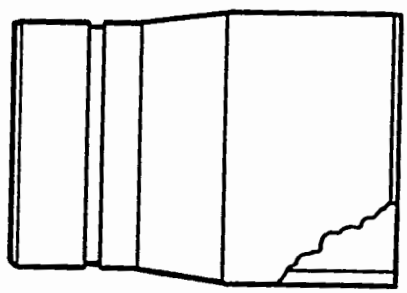
	PVC				PP				PVDF				
	Elastomer			Teflon®	Elastomer			Teflon®	Elastomer				Teflon®
Size	30°F 70°F	105°F	120°F	30° 120°F	−5°F 105°F	140°F	175°F	−5°F 175°F	−5°F 140°F	175°F	190°F	210°F	−5°F 210°F
¾"	150	150	100	85	150	100	90	70	150	120	100	85	85
1"	150	150	100	85	150	100	90	70	150	120	100	85	85
1½"	150	150	100	85	150	100	90	70	150	120	100	70	85
2"	150	150	100	85	150	100	80	70	150	120	90	55	85
2½"	150	100	100	85	150	85	70	70	150	100	80	55	85
3"	150	100	100	70	150	70	60	60	150	100	80	40	70
4"	100	70	70	70	100	65	40	60	100	85	60	40	70
5"	100	70	70	60	100	50	35	40	100	85	60	30	60
6"	100	70	60	40	100	40	30	30	100	70	50	30	40
8"	70	40	40	40	70	40	30	30	70	50	40	30	40

Link Joint Male x Flange Transition Fitting



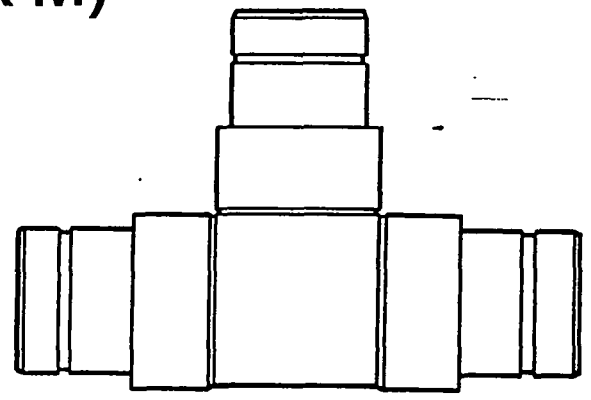
SIZE	DESCRIPTION	PSI RATING	PART NO.
2″	X FLANGE TRANSITION	250 PSI	2AFT20
3″	X FLANGE TRANSITION	250 PSI	3AFT21
4″	X FLANGE TRANSITION	250 PSI	4AFT22
6″	X FLANGE TRANSITION	250 PSI	6AFT23
8″	X FLANGE TRANSITION	200 PSI	8AFT24

Link By Glue Joint



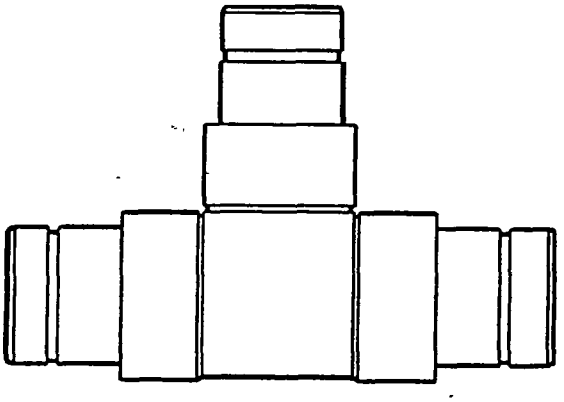
SIZE	DESCRIPTION	PSI RATING	PART NO.
2″	X GLUE TRANSITION	250 PSI	2AGT70
3″	X GLUE TRANSITION	250 PSI	3AGT71
4″	X GLUE TRANSITION	250 PSI	4AGT72
6″	X GLUE TRANSITION	250 PSI	6AGT73
8″	X GLUE TRANSITION	200 PSI	8AGT74

Link Tee (M x M x M)



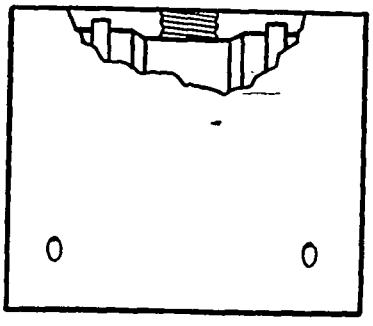
SIZE	DESCRIPTION	PSI RATING	PART NO.
2"	TEE (MxMxM)	250 PSI	2AT110
3"	TEE (MxMxM)	250 PSI	3AT111
4"	TEE (MxMxM)	250 PSI	4AT112
6"	TEE (MxMxM)	250 PSI	6AT113
8"	TEE (MxMxM)	200 PSI	8AT114

Link Reducing Tee (M x M x M)



SIZE	DESCRIPTION	PSI RATING	PART NO.
3" x 3" x 2"	REDUCING TEE (MxM)	250 PSI	332RT2
4" x 4" x 2"	REDUCING TEE (MxM)	250 PSI	442RT3
4" x 4" x 3"	REDUCING TEE (MxM)	250 PSI	443RT4
6" x 6" x 2"	REDUCING TEE (MxM)	250 PSI	662RT5
6" x 6" x 3"	REDUCING TEE (MxM)	250 PSI	663RT6
6" x 6" x 4"	REDUCING TEE (MxM)	250 PSI	664RT7
8" x 8" x 4"	REDUCING TEE (MxM)	200 PSI	884RT8
8" x 8" x 6"	REDUCING TEE (MxM)	200 PSI	886RT9

Link Outlet Coupling (F x F)
Tapped Female Pipe Threads



SIZE	TAPPED TRANSITION THREADS NPT	PSI RATING	PART NO.
2 x 2	¾" OUTLET	200 PSI	2TT400
2 x 2	1" OUTLET	200 PSI	2TT401
3 x 3	1½" OUTLET	160 PSI	3TT402
4 x 4	1½" OUTLET	160 PSI	4TT403
6 x 6	1½" OUTLET	200 PSI	6TT404
6 x 6	2" OUTLET	160 PSI	6TT405
8 x 8	1½" OUTLET	200 PSI	8TT406
8 x 8	2" OUTLET	160 PSI	8TT407

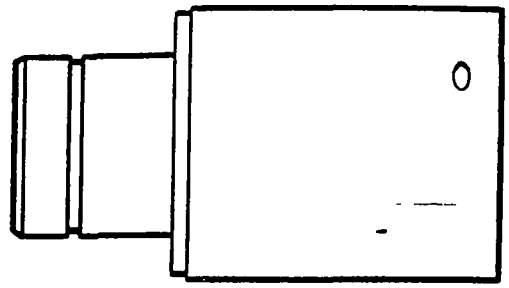
Straws (Splines)

SIZE		PART NO.
2"	SPLINES	A2SPL7
3"	SPLINES	A3SPL7
4"	SPLINES	A4SPL7
6"	SPLINES	A6SPL7
8"	SPLINES	A8SPL7
10"	SPLINES	A10SPL7
12"	SPLINES	A12SPL7

"O" Rings

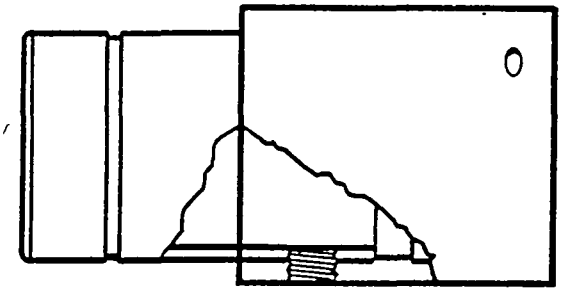
SIZE		PART NO.
2"	O' RING	A20RG8
3"	O' RING	A30RG8
4"	O' RING	A40RG8
6"	O' RING	A60RG8
8"	O' RING	A80RG8
10"	O' RING	A100RG8
12"	O' RING	A120RG8

Link Reducing Joint



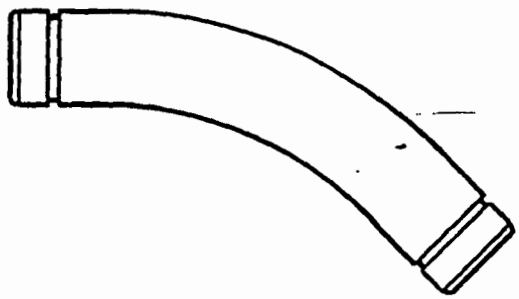
SIZE	DESCRIPTION	PSI RATING	PART NO.
4" x 2"	X AQUA TRANSITION	250 PSI	6RT4X2
4" x 3"	X AQUA TRANSITION	250 PSI	7RT4X3
6" x 2"	X AQUA TRANSITION	250 PSI	8RT6X2
6" x 4"	X AQUA TRANSITION	250 PSI	0RT6X4
8" x 4"	X AQUA TRANSITION	200 PSI	1RT8X4
8" x 6"	X AQUA TRANSITION	200 PSI	2RT8X6

Link Tapped Joint (F x M)



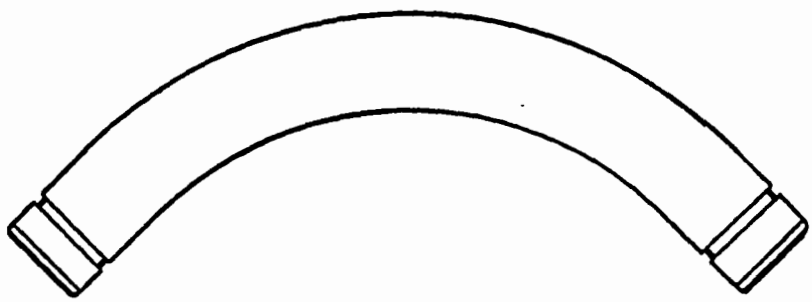
SIZE	TAPPED COUPLING THREADS NPT	PSI RATING	PART NO.
2 x 2	¾" OUTLET	250 PSI	2TC300
2 x 2	1" OUTLET	250 PSI	2TC301
3 x 3	¾" OUTLET	250 PSI	3TC302
3 x 3	1" OUTLET	250 PSI	3TC303
3 x 3	1½" OUTLET	250 PSI	3TC304
4 x 4	¾" OUTLET	250 PSI	4TC305
4 x 4	1" OUTLET	250 PSI	4TC306
4 x 4	1½" OUTLET	250 PSI	4TC307
6 x 6	¾" OUTLET	250 PSI	6TC308
6 x 6	1" OUTLET	250 PSI	6TC309
6 x 6	1½" OUTLET	250 PSI	6TC310
8 x 8	1½" OUTLET	200 PSI	8TC311
8 x 8	2" OUTLET	200 PSI	8TC312

Link 45° Sweep (M x M)



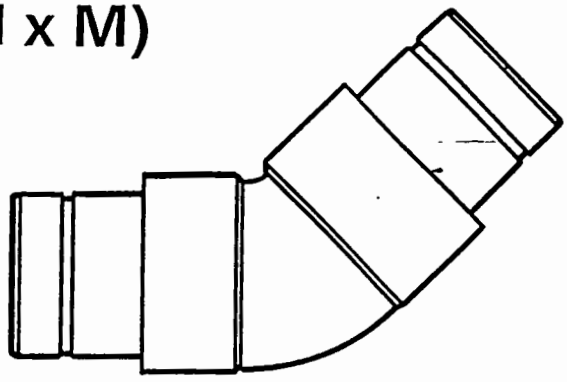
SIZE	DESCRIPTION	PSI RATING	PART NO.
2"	45° SWEEP (MxM)	250 PSI	245S10
3"	45° SWEEP (MxM)	250 PSI	345S11
4"	45° SWEEP (MxM)	250 PSI	445S12
6"	45° SWEEP (MxM)	250 PSI	645S13
8"	45° SWEEP (MxM)	200 PSI	845S14

Link 90° Sweep (M x M)



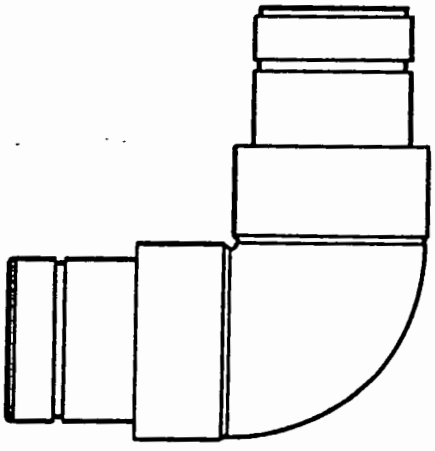
SIZE	DESCRIPTION	PSI RATING	PART NO.
2"	90° SWEEP (MxM)	250 PSI	290S90
3"	90° SWEEP (MxM)	250 PSI	390S91
4"	90° SWEEP (MxM)	250 PSI	490S92
6"	90° SWEEP (MxM)	250 PSI	690S93
8"	90° SWEEP (MxM)	200 PSI	890S94

Link 45° Elbow (M x M)



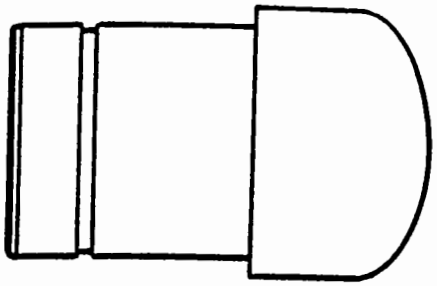
SIZE	DESCRIPTION	PSI RATING	PART NO.
2″	45° ELL (MxM)	250 PSI	245L80
3″	45° ELL (MxM)	250 PSI	345L81
4″	45° ELL (MxM)	250 PSI	445L82
6″	45° ELL (MxM)	250 PSI	645L83
8″	45° ELL (MxM)	200 PSI	845L84

Link 90° Elbow



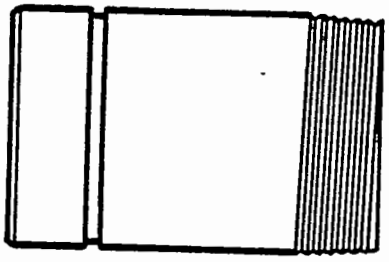
SIZE	DESCRIPTION	PSI RATING	PART NO.
2″	90° ELL (MxM)	250 PSI	290L70
3″	90° ELL (MxM)	250 PSI	390L71
4″	90° ELL (MxM)	250 PSI	490L72
6″	90° ELL (MxM)	250 PSI	690L73
8″	90° ELL (MxM)	200 PSI	890L74

Link End Cap M

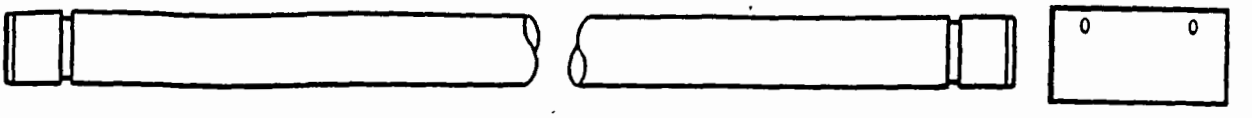


SIZE	DESCRIPTION	PSI RATING	PART NO.
2"	END CAP	250 PSI	2EC100
3"	END CAP	250 PSI	3EC101
4"	END CAP	250 PSI	4EC102
→ 6"	END CAP	250 PSI	6EC103
8"	END CAP	200 PSI	8EC104
10"	END CAP	160 PSI	10EC105
12"	END CAP	160 PSI	12EC106

Link Nipple M x M Pipe Threads

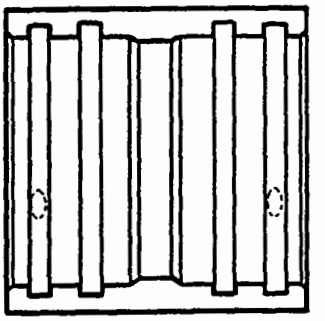


SIZE	DESCRIPTION	PSI RATING	PART NO.
2"	X THREADED NIPPLE	250 PSI	2ATN50
3"	X THREADED NIPPLE	250 PSI	3ATN51
4"	X THREADED NIPPLE	250 PSI	4ATN52
→ 6"	X THREADED NIPPLE	250 PSI	6ATN53
8"	X THREADED NIPPLE	200 PSI	8ATN54
10"	X THREADED NIPPLE	160 PSI	10ATN55
12"	X THREADED NIPPLE	160 PSI	12ATN56



DIA.	DESCRIPTION	LENGTH	PSI RATING	SDR	PART NO.
2"	PIPE	20'	250 PSI	SDR 17	217250
2"	PIPE	20'	200 PSI	SDR 21	221200
3"	PIPE	20'	250 PSI	SDR 17	317250
3"	PIPE	20'	200 PSI	SDR 21	321200
4"	PIPE	20'	250 PSI	SDR 17	417250
4"	PIPE	20'	200 PSI	SDR 21	421200
4"	PIPE	20'	160 PSI	SDR 26	426160
6"	PIPE	20'	250 PSI	SDR 17	617250
6"	PIPE	20'	200 PSI	SDR 21	621200
→ 6"	PIPE	20'	160 PSI	SDR 26	626160
8"	PIPE	20'	200 PSI	SDR 21	821200
8"	PIPE	20'	160 PSI	SDR 26	826160
10"	PIPE	20'	160 PSI	SDR 26	1026160
12"	PIPE	20'	160 PSI	SDR 26	1226160

Coupling
(O-Rings Installed)



SIZE	DESCRIPTION	PSI RATING	PART NO.
2"	COUPLINGS	250 PSI	2AAC10
3"	COUPLINGS	250 PSI	3AAC11
4"	COUPLINGS	250 PSI	4AAC12
→6"	COUPLINGS	250 PSI	6AAC13
8"	COUPLINGS	200 PSI	8AAC14
10"	COUPLINGS	160 PSI	10AAC15
12"	COUPLINGS	160 PSI	12AAC16

US NAVY NORTHERN DIVISION
REMEDIAL ACTION CONTRACT (RAC)
CONTRACT NO. N62472-94-D-0398
DELIVERY ORDER NO. 0013

STANDARD OPERATING PROCEDURES FOR SOIL HANDLING AND STORAGE SOP-1284-13-10

TANK FARM NO. 4 REMEDIAL ACTIONS
NAVAL EDUCATION AND TRAINING CENTER (NETC)
NEWPORT, RHODE ISLAND

June 1996

Prepared by

Foster Wheeler Environmental Corporation
470 Atlantic Avenue
Boston, Massachusetts 02210

Revision	Date	Prepared By	Approved By	Pages Affected
0	6/7/96	M. Gouveia	M. Zizza	All

TABLE OF CONTENTS

1.0 GENERAL

1.1 Related Codes and Standards

The publications listed below form a part of this Standard Operating Procedure (SOP) to the extent referenced and are referred to within the text by basic designation only. The work procedures of this SOP have been developed to incorporate the substantive requirements of these codes and standards. The current edition of each reference shall be utilized.

- Rhode Island Rules and Regulations to include:
  - Rules and Regulations for Hazardous Waste Management
  - Rules and Regulations for Solid Waste Management
  - Rules and Regulations for Underground Storage Facilities Used for Petroleum Products and Hazardous Materials
- Code of Federal Regulations (CFR)
  - 29 CFR 1910.120 Hazardous Waste Operations and Emergency Response
  - 29 CFR 1910.145 Accident Prevention Signs and Tags
  - 29 CFR 1910.146 Permit-Required Confined Spaces

1.2 Related Project Plans

The documents listed below were developed specifically for the Tank Farm No. 4 project and form a part of this SOP to the extent referenced.

- Work Plan (WP)
- Site Health and Safety Plan (SHSP)
- Quality Control Plan (QCP)
- Sampling and Analysis Plan (SAP)
- Waste Management Plan (WMP)
- Environmental Protection Plan (EPP)

1.3 Related Standard Operating Procedures (SOPs)

The documents listed below were developed specifically for the Tank Farm No. 4 project and form a part of this SOP to the extent referenced.

- SOP-1284-13-05 Tank Cleaning
- SOP-1284-13-08 Pipe Excavation and Removal
- SOP-1284-13-09 Pump Room and CT Chambers Demolition

1.4 Related Site Logistics Work Packages (SLWPs)

The documents listed below were developed specifically for the Tank Farm No. 4 project and form a part of this SOP to the extent referenced.

- SLWP-1284-13-01 Site Layout
- SLWP-1284-13-04 Tank Cleaning Systems Facilities

1.5 Description of Work

This SOP, along with the SAP and WMP, describes the soil handling and storage operations at Tank Farm No. 4. Soil will be generated from the excavation of the following items:

- Tank access
- Pump room access
- Loop and shunt piping removal
- Installation of temporary utilities

Activities conducted under this section will be performed in strict accordance with the SHSP, as well as with federal, state, and/or local authorities having jurisdiction.

2.0 PRODUCTS

The following list of materials and equipment is recommended for the execution of this SOP. This list is intended as a recommendation only. Equivalent materials and equipment may be substituted during field operations if changes have been approved by the Site Manager, after consultation with the appropriate disciplinary leads.

2.1 Materials

- Plastic sheeting
- 30-mil HDPE (high density polyethylene) liner
- Hay bales
- Sand bags
- Drainage sand

2.2 Equipment

- Flame ionization detector (FID)
- 325 CAT excavator (or equivalent)
- 644 John Deere loader (or equivalent)
- 6-Wheel dump trucks
- Appropriate personal protective equipment (PPE)
- 1½ Electric sump pump (Little Giant or equal)

3.0 EXECUTION

3.1 Prerequisites, Precautions, and Limitations

- Prior to any excavation, the location of underground utilities will be verified via Dig-Safe.

- No excavation will take place until all utilities have been abandoned and verified in the field.

- Care will be taken to minimize dust during all excavation and handling operations. This will occur with the use of a water truck, water hoses, and poly covers on stockpiled soils.

- Daily traffic patterns will be set to avoid congested work areas. These patterns will be discussed in the morning safety meeting and enforced in the field.

- Excavations will be limited to the areas needed to access work. This will prevent excessive soil stockpiles.

- All soil being excavated will be field screened using a FID and stockpiled in accordance with the SAP.

- All excavation areas will be clearly marked with flagging and cleared prior to excavation.

- All open excavations will be properly marked and fenced to prevent a fall hazard.

3.2 General

- Excavated soils generated during tank access, pump room access, buried pipe removal, and all other excavation activities will be segregated according to field screening performed with a FID and with the aid of visual inspection. Soils with a FID reading of less than 10 ppm will be staged next to the open excavation and used for backfill in accordance with the SAP.

- Soil having a FID reading between 10 ppm and 100 ppm or showing visual contamination will be loaded into 6-wheel dump trucks and transferred to the stock pile in a bermed and lined area. In accordance with the SAP, the stockpile will initially be tested for Total Petroleum Hydrocarbons (TPH). If the TPH result is 100 ppm or less, the soil will be utilized as backfill. Otherwise, full Toxicity Characteristic Leaching Procedure (TCLP), polychlorinated biphenyl (PCB), ignitability, and reactivity analyses will be performed on a stockpile soil sample to characterize the soil for proper disposal.

- Soil having a FID reading greater than 100 ppm will be loaded into 6-wheel dump trucks stockpiled in a separate section of the bermed and lined area referenced above. This soil will not be utilized as backfill. In accordance with the SAP, it will be characterized for disposal through TPH, full TCLP, PCB, ignitability, and reactivity analyses.

- A 50-foot by 50-foot containment area will be constructed to store all soils having a FID reading above 10 ppm or suspected to be contaminated based on visual inspection. This area will be bermed and lined with 30-mil HDPE. Additional containment areas will be constructed as required.

- The stockpiled material in the containment area will be covered with 10-mil HDPE when not in use. The stockpile will be shaped to permit run-off from the cover sheeting.

- A sump area will be constructed in the containment area to allow water removal during rain events. The water from this area will be pumped to the nearest uncleaned underground storage tank or to the nearest pump room with an active ring drain system.

US NAVY NORTHERN DIVISION
REMEDIAL ACTION CONTRACT (RAC)
CONTRACT NO. N62472-94-D-0398
DELIVERY ORDER NO. 0013

STANDARD OPERATING PROCEDURES FOR WATER TREATMENT FACILITY SOP-1284-13-11

TANK FARM NO. 4 REMEDIAL ACTIONS NAVAL EDUCATION AND TRAINING CENTER (NETC) NEWPORT, RHODE ISLAND

June 1996

Prepared By

Foster Wheeler Environmental Corporation
470 Atlantic Avenue
Boston, Massachusetts 02210

Revision	Date	Prepared By	Approved By	Pages Affected
0	6/7/96	M. Dippre	M. Zizza	All

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APPENDICES

1.0 GENERAL

1.1 Related Codes and Standards

The publications listed below form a part of this Standard Operating Procedure (SOP) to the extent referenced and are referred to within the text by basic designation only. The Work Procedures of this SOP have been developed to incorporate the substantive requirements of these codes and standards. The current edition of each reference shall be utilized.

- Rhode Island Rules and Regulations to include:
  - Rules and Regulations for Hazardous Waste Management
  - Rules and Regulations for Solid Waste Management
  - Division of Water Resource Rules and Regulations Series 12-190
- Code of Federal Regulations (CFR) to include:
  - 29 CFR 1910.120 Hazardous Waste Operations and Emergency Response
  - 29 CFR 1910.145 Accident Prevention Signs and Tags
  - 29 CFR 1910.146 Permit-Required Confined Spaces

1.2 Related Project Plans and Reports

The documents listed below were developed specifically for the Tank Farm No. 4 project and form a part of this SOP to the extent referenced.

- Work Plan (WP)
- Site Health and Safety Plan (SHSP)
- Quality Control Plan (QCP)
- Spill Prevention, Control and Countermeasures (SPCC)
- Waste Management Plan (WMP)
- Sampling and Analysis Plan (SAP)
- Environmental Protection Plan (EPP)

1.3 Related Standard Operating Procedures

The SOP documents listed below were developed specifically for the Tank Farm No. 4 project and form a part of this SOP to the extent referenced.

- SOP-1284-13-01 Ring Drain Systems
- SOP-1284-13-02 Water Removal
- SOP-1284-13-05 Tank Cleaning
- SOP-1284-13-09 Pump Room and CT Chambers Demolition

1.4 Related Site Logistics Work Packages (SLWPs)

The documents listed below were developed specifically for the Tank Farm No. 4 project and form a part of this SOP to the extent referenced.

- SLWP-1284-13-01 Site Layout
- SLWP-1284-13-02 On-Site Temporary Utilities
- SLWP-1284-13-05 Water Treatment Facility

1.5 Related Statements of Work (SOWs)

The SOW document listed below was developed specifically for the Tank Farm No. 4 project and forms a part of this SOP to the extent referenced.

- SOW-1284-13-11 Wastewater Treatment System Operation

1.6 Related Drawings

- 1284.0013.P1 Process Flow Diagram

1.7 Description of Work

This SOP describes the operation of the feed and discharge system for the Water Treatment Facility (WTF) associated with Tank Farm No. 4. A Process Flow Diagram is depicted in Dwg. No. 1284.0013.P1. This SOP will be amended at a later date to include the operating procedures for the WTF to be supplied by the WTF Subcontractor as required by SOW-1284-13-11. This SOP provides details of the process for delivering water from the influent storage tank (UST-43), to the WTF, to the effluent storage tank (UST-44) or frac tanks, and delivering treated water to the discharge manhole which ultimately discharges to the City of Newport Publicly Owned Treatment Works (POTW). Activities conducted under this SOP will be performed in accordance with the SHSP and comply with federal, state, and/or local authorities having jurisdiction as described herein.

1.8 Remaining Data Gaps

The following items will be resolved prior to implementation of this SOP:

- WTF SOP from Subcontractor is approved.
- POTW permit from City of Newport is received.
- RFI from Navy ROICC allowing use of abandoned 16-inch fuel oil line for treated water transfer is received.

The above items will be checked for conformance with the assumptions of this SOP.

2.0 PRODUCTS

The following list of material and equipment is recommended for the execution of this SOP. This list is intended as a recommendation only. Equivalent materials and equipment may be substituted during field operation if changes have been approved by the Site Manager and, if necessary, after consultation with the Project Engineer.

2.1 Materials

- Oil wipes
- Transfer hose (rubber or plastic based, spiral wound, camlock ends)
- pH Paper
- Sample bottles
- Record keeping and reporting forms

2.2 Equipment

- Electric submersible pumps (six plus one spare)
- Hand tools (pipe wrench, wrench, pliers, etc.)
- Spill kit
- Personal protective equipment (PPE) - (modified D)
- Lock out/tag out
- Air monitoring equipment
- Polyethylene sheeting
- Flash lights

3.0 EXECUTION

3.1 Prerequisites, Precautions, and Limitations

A. The Site Health and Safety Officer SHSO shall review work procedures and PPE requirements prior to commencement of work.

B. Tanks may contain an oil layer which will have to be penetrated to gain access to the water layer.

C. Air monitoring, confined space entry, and ventilation will be required in accordance with the SHSP.

D. Precautions shall be taken to ensure that free liquids do not spill during the water transfer procedure. This includes initial leak testing, routine inspection of hose runs and couplings, draining of liner before breaking couplings, and contaminant of residual water when breaking couplings.

E. Spills shall be promptly reported to the SHSO, controlled, contained, and cleaned up in accordance with the SPCC. Spills may need to be reported to regulatory agencies. Notification and reporting requirements shall be followed in accordance with the SPCC.

F. Precautions shall be taken to ensure that the tank level is not lowered below 11 feet below the maximum groundwater table until the ring drain system is activated in accordance with SOP-1284-13-01.

G. Pump shall be lowered into the tank using a chain hoist rated for the intended load.

H. All equipment exposed to untreated water or oil shall be cleaned and decontaminated prior to reuse or removal from site. Prior to removal from site, this equipment will be listed on a decontamination certificate.

I. Routine inspections shall be done to check:
   1. All connections on the transfer line;
   2. The inlets to UST-43;
   3. Oil layer level (if present) with respect to pump intake location; and
   4. General safety of the work area.

J. All equipment used inside USTs shall be explosion-proof Class I, Division 1, Group D. All electrical equipment used within 25 feet of the tank opening shall be Class I, Division 2, Group D.

3.2 Set Up Procedures

Procedures for delivering water to Tank UST-43 from various cleaning or support operations will be according to the SOPs identified in Section 1.3.

A. Sump pump installation in Tank UST-43
   1. Position sump pumps as far as practical from inflow discharges in the tank to maximize settlement time and to minimize entrainment of disturbed sludge.
   2. Provide access to the saw-cut hole to allow insertion of sump pumps.
   3. Position gantry with rated chain hoist above the access hole and secure to tank top.
   4. Install wood blocking around perimeter of access hole(s) to protect hoses and cables from sharp edges.
   5. Attach 4-inch discharge hoses to the discharge of each pump. Secure camlock fittings with wire.
   6. Tag ends of each discharge hose to indicate which pump corresponds to which hose (i.e. hose #SP-1A corresponds to sump pump #SP-1A).
   7. Tag ends of each power cable to indicate which pump corresponds to which power cable (i.e. power cable #SP-1A corresponds to sump pump #SP-1A).
   8. Pre-measure depth of setting for each pump, and mark on discharge hoses. Pumps will be positioned with intakes as follows:
      a. SP-1A intake at 11 feet below maximum elevation of groundwater
      b. SP-1B intake at 1 foot above SP-1A intake
      c. SP-1C intake at 1 foot above SP-1B intake
      d. SP-1D intake at 1 foot above SP-1C intake
   9. Lower pumps into tank to pre-measured depth. Secure discharge lines and power cables to gantry.
   10. To prevent accidental injury, ensure no openings greater than 6 inches remain in the UST.
   11. Plug sump pump power cable into corresponding power receptacle.

B. Discharge Frac Tanks
   1. Verify that each end of all hoses have camlock fittings secured with wire.
      a. Influent hose from WTF to frac tanks.
      b. Frac tank interconnection hoses (2).
      c. Effluent hose from frac tanks to pump manifold.
      d. Hose from pump discharge manifold to flow meter.
      e. Hose from flow meter to CT chamber A-10.

2. Verify that WTF discharge valve is open.
3. Verify that influent valves to frac tanks are open.
4. Verify that each frac tank is vented.
5. Verify that effluent valves from frac tanks are closed.
6. Keep all non-essential personnel away from frac tanks.

C. Discharge Pumps
1. Verify valving configuration for anticipated flow (100 gpm or 300 gpm).
2. Plug power cable into corresponding power receptacle.

D. Tank UST-44 (if used)
1. Position sump pumps as far as practicable from inflow discharges in the tank to minimize entrainment of air.
2. Remove steel plates covering the saw-cut access hole.
3. Position gantry with rated chain hoist above the access hole and secure to tank top.
4. Attach 4-inch discharge hoses to the discharge of each pump. Secure camlock fittings with wire.
5. Tag ends of each discharge hose to indicate which pump corresponds to which hose (i.e. hose #SP-3A corresponds to sump pump #SP-3A).
6. Tag ends of each power cable to indicate which pump corresponds to which power cable (i.e. power cable #SP-3A corresponds to sump pump #SP-3A).
7. Pre-measure depth of setting for each pump, and mark on discharge hoses. Pumps will be positioned with intakes 11 feet below maximum groundwater elevation, and 10 feet below maximum groundwater elevation, respectively.
8. Lower pumps into tank to pre-measured depth. Secure discharge lines and power cables to gantry.
9. Verify that each end of all hoses have camlock fittings secured with wire.
   a. Influent hose from WTF to Tank UST-44.
   b. Effluent hose from Tank UST-44 to frac tank.
10. Plug sump pump power cable into corresponding power receptacle.

E. Power, instrumentation and control
1. Verify that circuit breakers for power for sump pumps SP-1A through SP-1D, and SP-3A and SP-3B (if used) are closed.
2. Verify that power to instrumentation (on WTF control panel) is operational and tested:
   a. UST-43 high level alarm
   b. UST-43 low level interlock
   c. Oil/water separator high level interlock
   d. Filter feed pump interlock
   e. Bag filter high ΔP alarm
   f. GAC filter high ΔP alarm
   g. UST-44 high level alarm
   h. UST-44 high-high level interlock
   i. UST-44 low level interlock
   j. Frac tank low level interlock
   k. Frac tank high level alarm
   l. Frac tank high-high level interlock
   m. Alarm annunciation

3.3 Coordination With WTF Operator

Before operation of sumps pumps SP-1A through SP-1D and at each change of shift, the influent tank operator shall coordinate influent tank pumping schedule with the WTF operator.

A. Confirm with the WTF operator which treatment trains will be utilized. The influent tank operator shall determine the required number of trains according to the formula given in Section 3.4 A.

B. Confirm with the WTF operator that the WTF trains are operational.
   1. Indicate on log sheets that each WTF train is operational:
      a. Verify that each end of all hoses in WTF have camlock fittings secured with wire.
      b. Verify that all required valves in desired treatment train are open.
      c. Verify that the unit processes are operational:
         - adequate capacity in oil/water separator
         - adequate capacity in bag filters
         - adequate capacity in activated carbon filters
      d. Verify that all WTF controls and instrumentation are operational.

C. Confirm with WTF operator, for the upcoming shift:
   1. Intended rate of flow in each water treatment train
   2. Intended length of time for pumping in each water treatment train
   3. Indicate items (1) and (2) on log sheets (See Appendix B)

3.4 Influent Pumping Scheme

A. The influent pumping scheme is based upon the consideration that the influent storage tank capacity cannot be exceeded. The required remaining water layer storage capacity of the influent storage tank is:

$$S_{infl\ req'd} = [Tank1gpm + Tank2gpm + \ldots + Agpm + Bgpm + Cgpm + Dgpm - Egpm] \times (\text{minutes to pump})$$

where $S_{infl\ req'd}$ = required remaining influent tank storage
Tank1gpm = Total pumping rate from Tank 1 cleaning operations, etc.
Agpm = Rate of decon water pumping
Bgpm = Rate of pipewash system pumping
Cgpm = Rate of asbestos abatement water pumping
Dgpm = Rate of personnel shower water pumping
Egpm = Rate of water treatment processing

Example: If the total rate of pumping to the influent tank for the shift will average 300 gpm and the water treatment processing rate is 100 gpm, and a 12 hour shift is desired, the required remaining water layer storage capacity of the influent tank is 144,000 gallons.

B. The available influent tank capacity, S_{avail} (gallons), as a function of remaining water layer depth, is equal to:

S_{avail} = 79000 x (remaining water depth, feet)

Thus, in the example provided in A, the required storage capacity would be 144,000/79,000 or approximately 2 feet.

C. If the required remaining influent tank storage capacity ($S_{infl\ req'd}$) is greater than the available storage capacity (S_{avail}) in the influent storage tank, the operator shall do one of the following:

1. Inform tank cleaning personnel that inflows to UST-43 must be reduced.
2. Inform the WTF operator that the WTF processing capacity must be increased by adding an additional treatment train, if available.
3. The calculation for $S_{infl\ req'd}$ shall be repeated until the available storage capacity (S_{avail}) is greater, for the desired period of operation.

3.5 Discharge Pumping Scheme

The pumping scheme is an arrangement to ensure that:

- water is treated by the WTF at the maximum allowable rate at all times; and
- the required maximum treated water effluent flow rates are not exceeded.

The maximum discharges to the City of Newport POTW have been specified as:

Time	Maximum allowable discharge
Weekdays 0600-1800	100 gpm
Weekdays 1800-0600	300 gpm
Weekends and Holidays	300 gpm
7 day week	2,304,000 gallons (plus 144,000 gals. per holiday)

The pumping scheme is developed based upon the above maximum discharges.

A. Discharge pumping scheme during weekdays 0600-1800

1. Frac tank(s) only available for discharge storage
   a. Since only 100 gpm are permitted to be discharged, a higher water treatment processing rate requires storage in the frac tanks. The required storage in frac tanks is:

$$S_{frac\ req'd} = (R - 100) \times (\text{minutes remaining in weekday shift}),$$
where R = water treatment processing rate

Thus, if the required water treatment processing rate is 150 gpm from 0600 to 1800 hours on a weekday, the required storage will be 36,000 gallons in frac tanks.

   b. Prepare frac tank(s) for service as described in 3.2 B.
2. Frac tank(s) and Tank UST-44 available for storage.
   a. If required storage exceeds the available frac tank storage capacity,

$S_{frac\ req'd}$, the Tank UST-44 may be utilized for storage.

b. Check remaining capacity of Tank UST-44. The remaining capacity of Tank UST-44 must accommodate storage capacity which is unavailable in frac tank(s):

$$S_{avail} = 79000 \text{ x (remaining water depth, feet)}$$

c. If the required remaining Tank UST-44 storage capacity is greater than the available storage capacity (S_{avail}) in the influent storage tank, the operator shall do the following:

1. Inform influent tank operator and WTF operator that inflows must be reduced. The calculation shall be repeated until the available storage capacity (S_{avail}) is adequate for the desired period of operation.

d. Prepare Tank UST-44 as described in 3.2 D.

3. Discharge pump operator must verify the following:
   a. Flow meter indicates a maximum of 100 gpm discharge to manhole.
   b. If discharge to manhole exceeds 100 gpm, throttle flow after flowmeter until flowmeter indicates 100 gpm.
   c. Discharge pump operator must verify that frac tanks and/or Tank UST-44 storage capacity is adequate.

B. Discharge pumping scheme during weekdays 1800-0600 or weekends and holidays.
   1. Since the maximum allowed discharge to the manhole is 300 gpm, the WTF will be allowed to run up to 3 operational trains simultaneously.
   2. Discharge pump operator must verify the following:
      a. Flow meter indicates a maximum of 300 gpm discharge to manhole.
      b. If discharge to manhole exceeds 300 gpm, throttle flow after flowmeter until flowmeter indicates 300 gpm.
      c. Discharge pump operator must verify that frac tanks and/or Tank UST-44 storage capacity is adequate.

3.6 System Operation

Before operation of the system, the operator shall verify the following:

A. Materials and equipment on hand per Section 2.1 and 2.2
B. Prerequisites, precaution, and limitations in place per Section 3.1
C. Set up procedures accomplished per Section 3.2
D. Coordination with WTF operator per Section 3.3
E. Calculations performed to ensure adequate capacity in Tank UST-43, frac tanks, and Tank UST-44 per Sections 3.4 and 3.5
F. Spill kit on-hand per Section 2.2

3.7 Sampling, Data Gathering, Reporting, and Analysis

The sampling, data gathering, reporting and analysis frequency will be a function of the operating conditions, permit requirements, and will be performed per the requirements of the Sampling and Analysis Plan (SAP).

A. Sampling Schedule

The following parameters shall be recorded at 0600, 1200, and 1800 hours on the log sheet, except for discharge flow rate which shall be recorded hourly (see Appendix B):

1. Discharge flow rate, gpm
2. Total volume, gal.
3. Discharge pH
4. Tank UST-43 water level, ft.
5. Frac tank water level, ft.
6. Tank UST-44 water level, ft.
7. No. of WTF trains operating

B. Effluent water sample analysis

Per the SAP, the effluent water will be sampled and submitted for analysis as follows:

- one sample at startup of the WTF (one each, first 2 days)
- one sample per week, first month of operation
- one sample per month after first month of operation
- one sample when a new tank dewatering begins

The effluent water sample will be delivered to the analytical lab and analyzed within 5 days for the following:

- TSS (total suspended solids)
- TDS (total dissolved solids)
- COD (chemical oxygen demand)
- BOD (biochemical oxygen demand)
- TTO (total toxic organics)
- Oil and Grease
- TCLP metals (toxicity characteristics leaching procedure)

C. Reporting

The recorded parameters (R), as listed above, shall be reported to the following personnel, no later than 24 hours after the end of the recording date:

1. Field Operations Lead (FOL)
2. Site Engineer
3. Project Engineer
4. Navy ROICC

The analytical results, per Section B, shall be delivered to the above personnel when available.

D. Sample Log Sheet

A sample log sheet is included as Appendix B.

APPENDIX A

CTO 143-TANK FARM NO. 04 TANK PHASE
VOLUME ESTIMATE
HALLIBURTON NUS CORPORATION

	TANK			HEAD SPACE	OIL		WATER		SLUDGE		TOTAL LIQUIDS		
	DIAMETER	DEPTH (ft)	VOL. (gal)	DEPTH (ft)	DEPTH (ft)	VOL. (gal)	DEPTH (ft)	VOL. (gal)	DEPTH (ft)	VOL (gal)	DEPTH (ft)	VOL (gal)	DATE
TANK 37	116	33.54	2635607.88	18.62	0.51	40076	14 26	1120566	0.15	11787	14 92	1172429	03/02/95
TANK 38	116	33.6	2640322.74	6.21	0 61	47934	26 66	2094970	0.12	9430	27.39	2152335	03/02/95
TANK 39	116	33.93	2666254.48	5.48	0.96	75438	25 54	2006960	1.95	153233	28.45	2235630	02/28/95
TANK 40	116	33 55	2636393 69	0.63	2.75	216098	30 15	2369218	0 02	1572	32 92	2586888	03/01/95
TANK 41	116	33.57	2637965 31	21.25	1.3	102155	11 02	865963	0	0	12 32	968118	03/02/95
TANK 42	116	33 57	2637965.31	26.62	0 65	51078	6.28	493489	0.02	1572	6.95	546138	03/03/95
TANK 43	116	33.56	2637179 5	14.8	1.62	127301	16.89	1327234	0.25	19645	18.76	1474180	02/28/95
TANK 44	116	33 62	2641894 36	14 42	1.73	135945	17.37	1364953	0.1	7858	19.2	1508756	03/02/95
TANK 45	116	32 59	2560955 9	22.65	0 6	47149	9.34	733947	0	0	9.94	781095	03/01/95
TANK 46	116	33 58	2638751.12	23 87	0.71	55793	8.99	706443	0 01	786	9.71	763022	03/03/95
TANK 47	116	33.46	2629321.4	55.505	0.47	36933	10 36	814100	0.125	9823	10 955	860855	02/27/95
TANK 48	116	33 57	2637965 31	13.07	0 95	74652	19 5	1532330	0.05	3929	20.5	1610911	02/28/95

NOTE: Tanks UST-43 and UST-44 to be cleaned prior to utilization.

Data from "Transmittal of Results of Tank Guaging at Tank Farm 4, NETC-Newport, Rhode Island" dated March 21, 1995.

APPENDIX B

SAMPLE LOG SHEET

TANK FARM NO. 4 - DAILY LOG SHEET

Date: _____ Operator: _____

Parameter	Time of day			Comments
	0600	1200	1800	
Discharge flow rate, gpm				
Total volume, gal				
Discharge pH				
Tank UST-43 water level, ft				
Frac tank water level, ft				
Tank UST-44 water level, ft				
No. of WTF trains operating				

NOTES:

1. Indicate effluent water samples when taken:
   a. One at startup of WTF (one each, first two days)
   b. One sample per week, first month of operation
   c. One sample per month after first month of operation
   d. One sample when a new tank dewatering begins

Distribution:

1. Field operations lead
2. Site Engineer
3. Project Engineer

US NAVY NORTHERN DIVISION
REMEDIAL ACTION CONTRACT (RAC)
CONTRACT NO. N62472-94-D-0398
DELIVERY ORDER NO. 0013

STANDARD OPERATING PROCEDURES FOR STEEL PROCESSING AND HANDLING SOP-1284-13-12

TANK FARM NO. 4 REMEDIAL ACTIONS NAVAL EDUCATION AND TRAINING CENTER (NETC) NEWPORT, RHODE ISLAND

June 1996

Prepared by

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Revision	Date	Prepared By	Approved By	Pages Affected
0	6/7/96	M. Gouveia	M. Zizza	All

TABLE OF CONTENTS

1.0 GENERAL

1.1 Related Codes and Standards

The publications listed below form a part of this Standard Operating Procedure (SOP) to the extent referenced and are referred to within the text by basic designation only. The work procedures of this SOP have been developed to incorporate the substantive requirements of these codes and standards. The current edition of each reference shall be utilized.

- 12-030-015 Rhode Island Rules and Regulations for Solid Waste Management
- Code of Federal Regulations (CFR)
  - 29 CFR 1910.120 Hazardous Waste Operations and Emergency Response
  - 29 CFR 1910.145 Accident Prevention Signs and Tags

1.2 Related Project Plans

The documents listed below were developed specifically for the Tank Farm No. 4 project and form a part of this SOP to the extent referenced.

- Work Plan (WP)
- Site Health and Safety Plan (SHSP)
- Quality Control Plan (QCP)
- Waste Management Plan (WMP)

1.3 Related Standard Operating Procedures (SOPs)

The SOP documents listed below were developed specifically for the Tank Farm No. 4 project and form a part of this SOP to the extent referenced.

- SOP-1284-13-07 Pipe Draining and Free Liquid Removal
- SOP-1284-13-08 Pipe Excavation and Removal
- SOP-1284-13-09 Pump Room and CT Chambers Demolition

1.4 Related Site Logistics Work Packages (SLWPs)

The document listed below was developed specifically for the Tank Farm No. 4 project and forms a part of this SOP to the extent referenced.

- SLWP-1284-13-01 Site Layout

1.5 Description of Work

This SOP provides for the steel handling and processing for steel removed from the following systems located at Tank Farm No. 4.

- Loop and Shunt
- Pump Rooms
- CT Chambers
- Tanks

The piping may contain various liquids including but not limited to water, fuel oils, and bottom sediments. Free liquids will be removed from the piping in accordance with SOP-1284-13-07. Therefore, all activities conducted under this section shall be performed in strict accordance with the approved SHSP and SLWP-1284-13-01, as well as with other appropriate federal, state, and local authorities having jurisdiction.

2.0 PRODUCTS

The following list of materials and equipment is recommended for the execution of this SOP. This list is intended as a recommendation only. Equivalent materials and equipment may be substituted during field operations if changes have been approved by the Site Manager, after consultation with the appropriate disciplinary leads.

2.1 Materials

- Appropriate collection containers
- Absorbent materials/containment materials
- Plastic sheeting

2.2 Equipment

- Wrenches
- Appropriate personal protective equipment (PPE) as specified by the Site Health and Safety Officer (SHSO)
- Torch
- Flame retardant protection clothing
- Rated slings and chokers
- 35-ton crane
- PPE (Level C)
- Confined space entry equipment in accordance with the SHSP

3.0 EXECUTION

3.1 Prerequisites, Precautions, and Limitations

- Cutting and removing pipe that may contain unknown contents of residual materials can be potentially dangerous. Pipes should be inerted prior to cutting. Where sharp edges may be a consideration, work gloves shall be worn.

- All pipes will be cut into manageable lengths prior to moving.

- If pipes have gross visible surface contamination, the external surface area will be decontaminated prior to loading into containers.

- All non-reusable contaminated material (PPE, containment material, etc.) and hazardous free product shall be handled, labeled, containerized and stored in accordance with the WMP, the SHSP and 29 CFR.

- All asbestos abatement must be completed in accordance with SOW-1284-13-09 and 29 CFR 1901.1001 in the work zone prior to steel handling.

3.2 General

A. Selection of the proper equipment to cut the pipe will be based on the prior contents of the pipe, the pipe diameter, and material. The selection of the appropriate equipment will be made by the Site Manager in consultation with the SHSO.

B. Cutting pipe using burning techniques:

- Obtain welding and hot work permit.
- Remove flammable materials from area.
- Remove gross contamination from surface of pipe.
- Provide proper ventilation.
- Make sure the pipe has been cleaned in accordance with SOP-1284-13-07.
- Use appropriate protective gear.

C. All pipe will be cut by trained personnel.

D. Pipe will be cut into manageable lengths, decontaminated as necessary and rigged with properly rated slings. The pipe will be loaded directly into roll-off if available. If no roll-off is present at the work zone, the pipe will be stockpiled next to the work area. The stockpiled steel will be loaded into a centralized scrap roll-off using a loader.

E. The Contracting Officer will determine the equipment and steel that is to be salvaged.

SOW-1284-13-10: Temporary Structure

ON HOLD

ATTACHMENT A

UNITED STATES DEPARTMENT OF THE NAVY NO. N62472-94-D-0398
DELIVERY ORDER No. 013
REMEDIAL ACTION CONTRACT

STATEMENT OF WORK
FOR
WASTEWATER TREATMENT SYSTEM OPERATION
TANK FARM 4
NAVAL EDUCATION AND TRAINING CENTER (NETC)
Newport, Rhode Island

SOW-1284-13-11

April 1996

Prepared By:

Foster Wheeler Environmental Corporation
470 Atlantic Avenue
Boston, MA 02210

Package Status	Date	Prepared By	Approved By	Pages Affected
Rev. 0	4/15/96	J. Brinkman for K. Shea	M. Zizza	

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FIGURES

APPENDICES

1.0 GENERAL DESCRIPTION

1.1 Purpose

This Statement of Work (SOW) provides the subcontractor with a description of the equipment and services required to treat wastewaters generated as a result of remedial activities conducted by Foster Wheeler Environmental Corporation (Foster Wheeler Environmental) at the U.S. Navy Northern Division (Navy) Naval Education and Training Center (NETC) Tank Farm 4 located in Portsmouth, Rhode Island (the Site). All work for this SOW will be performed under the technical direction of Foster Wheeler Environmental.

1.2 Site Location

The Site is located approximately 25 miles southeast of Providence, Rhode Island in the town of Portsmouth, Rhode Island (Newport County) as shown in Figure 1-1. The Defense Highway is to the north/northwest of the site, Narragansett Bay is located 500 to 1,000 feet to the west and Norman's Brook is located in the southwest corner of the Site. A residential area is located to the southeast of the Site and undeveloped woodlands are located north/northeast of Tank Farm 4. Located to the south and to the north are NETC Tank Farm 5 and Tank Farm 3, respectively. Refer to Figure 1-2 for the site layout.

1.3 Project Description

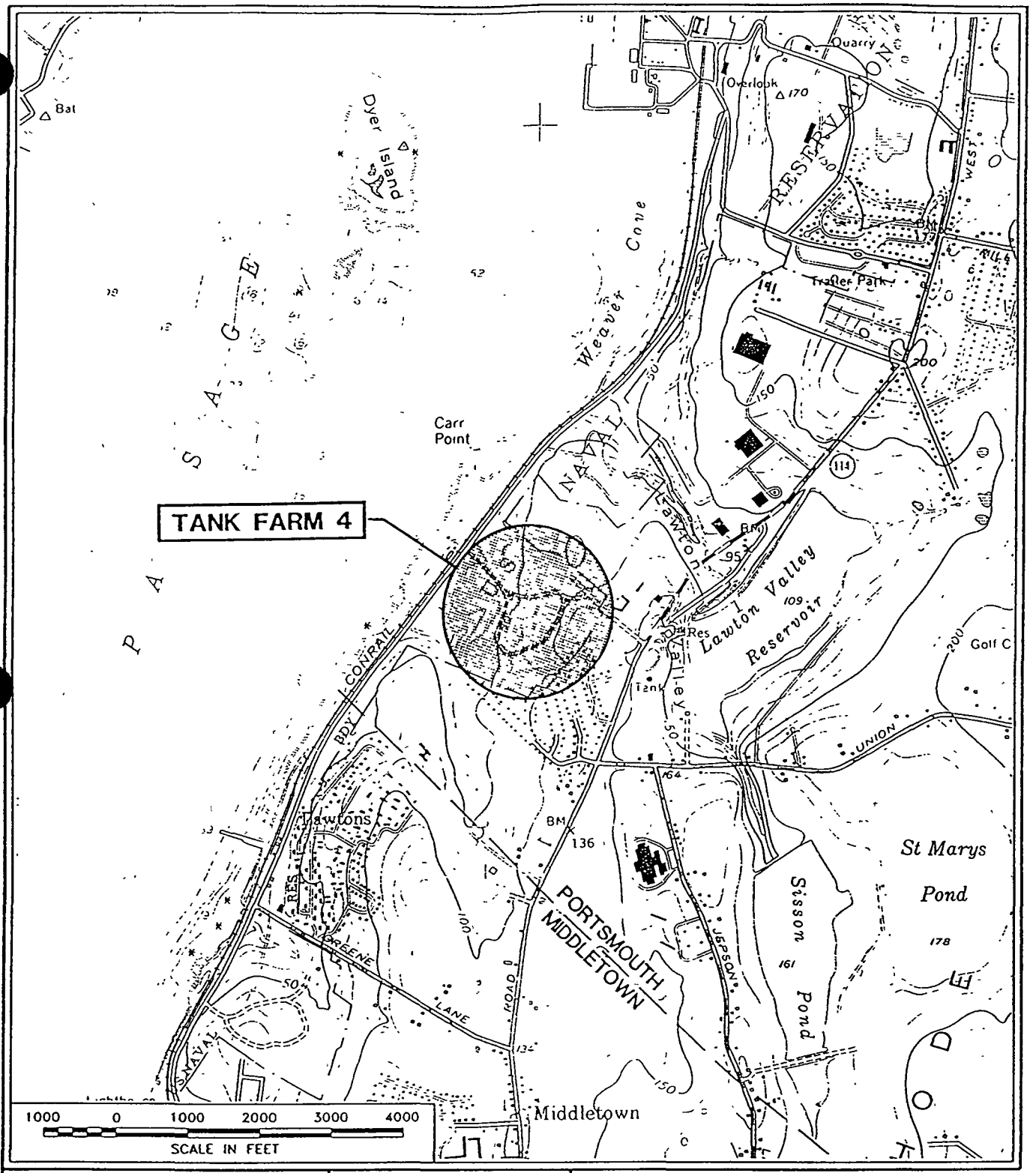
The NETC Tank Farm 4 consists of approximately 90 acres of open land containing 12 large reinforced concrete underground storage tanks (USTs) owned and controlled by the Navy. Tank Farm 4 is located approximately 20 to 111 feet above sea level. The tank farm was constructed by the Navy in 1941 and was used to store liquid petroleum products. However, the USTs have not been in use since the 1970's.
In 1992, the State of Rhode Island enacted UST regulations and therefore the USTs at NETC Tank Farm 4 became subject to these closure requirements. The Navy initiated the process for permanent closure of the USTs, and in 1996, Foster Wheeler Environmental was selected as the Contractor to complete the closure of the USTs in Tank Farm 4. Closure activities will include removal of all contents from the USTs, and cleaning and repairing the USTs. The contaminants of concern at Tank Farm 4 are those associated with petroleum based products and asbestos pipe insulation.

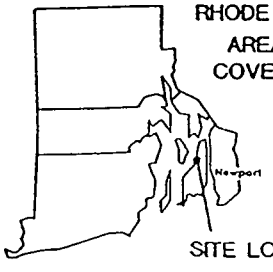
Other on-site structures include a decommissioned electrical substation, and an oil-water separator. A paved access road leads into the site and loops around the site providing access to the USTs. The outer perimeter of the Site is covered with dense brush and is heavily wooded. A perimeter fence surrounds the site along three (3) sides and most of the Site is covered with tall grass, dense brush and small diameter trees.

1.4 Definitions

1.4.1 The Term "Subcontractor"

The term "Subcontractor" shall mean the person, persons, partnership, corporation, or business organization engaged on behalf of Foster Wheeler Environmental pursuant to a contract for performance of work described in this SOW.





N

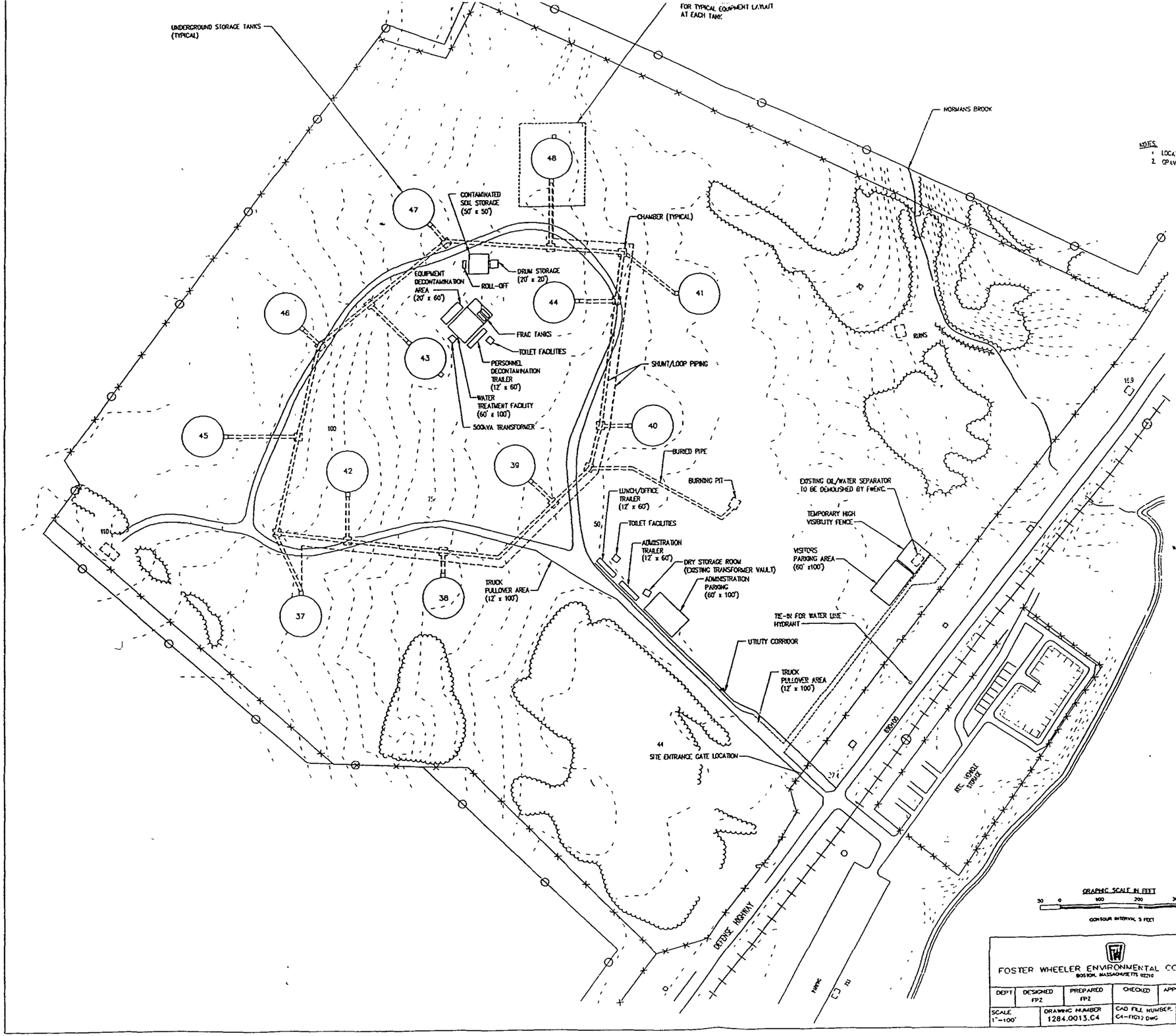
FIGURE 1-1

Naval Education and Training Center
Newport, Rhode Island

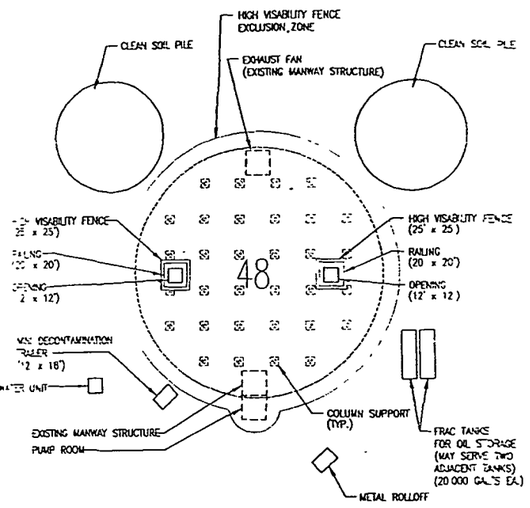
SITE LOCATION MAP

SCALE: AS SHOWN	PROJ. NO. 1284.0013.0103

CADFILE-1284FG11.DWG



NOTES:
1. LOCATION OF EQUIPMENT MAY BE FIELD ADJUSTED AS NECESSARY
2. GRAVEL ACCESS ROAD WILL BE LOCATED IN THE FIELD



DETAIL 1

TYPICAL EQUIPMENT LAYOUT
AT EACH TANK LOCATION
SCALE 1" = 50'

PREPARED BY:

FOSTER WHEELER ENVIRONMENTAL CORPORATION
470 ATLANTIC AVENUE, BOSTON, MASSACHUSETTS 02210

BASE MAP DERIVED FROM:

MELVILLE SOUTH, EXISTING CONDITIONS MAP, NETC DWG. 31062-307 DATED 4/95, FROM THE DEPARTMENT OF THE NAVY, NAVAL FACILITIES ENGINEERING COMMAND, EDUCATION AND TRAINING CENTER, NEWPORT, RHODE ISLAND

GRAPHIC SCALE IN FEET
50 0 100 200 300 400
CONTOUR INTERVAL 5 FEET

FIGURE 1-2

FOSTER WHEELER ENVIRONMENTAL CORPORATION
BOSTON, MASSACHUSETTS 02210

DEPT	DESIGNED FPZ	PREPARED FPZ	CHECKED	APPROVED	DATE 4/16/96
SCALE 1"=100'	DRAWING NUMBER 1284.0013.C4	CAD FILE NUMBER C4-FIG1.DWG	SH	OF	REV

NETC DWG NO XXXXXX
OSGN XXXXX
OR. XXXX
ER
DWR
APPROVED DATE
SATISFACTORY TO
DATE

DEPARTMENT OF THE NAVY NAVAL FACILITIES ENGINEERING COMMAND
NAVAL EDUCATION AND TRAINING CENTER
NEWPORT, RHODE ISLAND

TANK FARM 4 CLOSURE
NAVY REMEDIAL ACTION CONTRACT
DELIVERY ORDER NO.13
SITE PLAN

SIZE	CODE IDENT NO.	MANFAC DRAWING NO.
F	80091	
SCALE XXXX	CONSTR. CONTR NO XXXX	
	SPEC XXXXX	SHEET X OF X

1.4.2 The Term "Contractor"

The term "Contractor" within this SOW shall mean Foster Wheeler Environmental or the person delegated responsible charge of work by Foster Wheeler Environmental, or its authorized agents and assistants, acting jointly or severally within the scope of the particular duties and authorities delegated to them.

2.0 SCOPE OF WORK

2.1 Scope of Work

The Subcontractor shall supply, install and service three (3) identical, separately operated, 100 gallon per minute (gpm) skid-mounted wastewater treatment units as part of a wastewater treatment system. The treatment system is to be operated by Foster Wheeler Environmental for treatment of wastewater produced during the remediation of the Tank Farm 4 USTs. This water will be collected and require treatment for oil, grease and solids removal before it can be discharged to the local Publicly Owned Treatment Works (POTW).

Included in Appendix A are Technical Specifications that are an integral part of this SOW.

Technical Specification for Wastewater Treatment System
Section 15060 - Plastic Pipe, Fittings and Valves

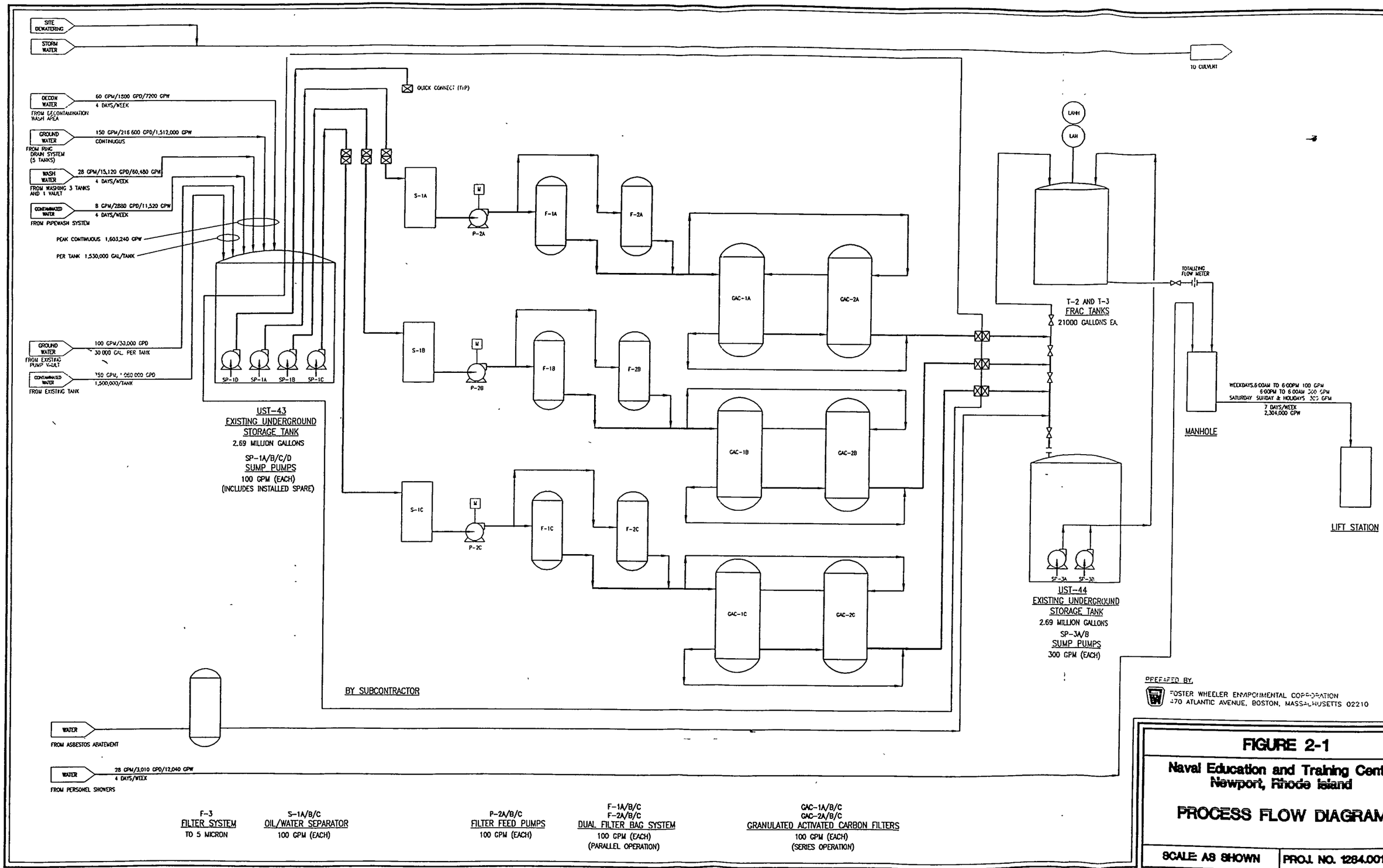
The Subcontractor shall immediately bring to the attention of Foster Wheeler Environmental's technical representative any conflicts noted in the Technical Specification or conflicts between the Technical Specifications and the information presented in the SOW.

2.2 Wastewater Treatment System

The wastewater treatment units shall be located on a treatment pad which is approximately 60 feet x 80 feet. The treatment pad (to be provided by Foster Wheeler Environmental) will be level and constructed of crushed stone with liners (geotextile and high density polyethylene) beneath and bermed with hay bales. The oil/water separators will be located outdoors but the pumps, bag filters and carbon adsorption units will be sheltered within a temporary structure approximately 40 feet x 80 feet (to be provided by Foster Wheeler Environmental). The temporary structure can be ventilated if required to meet the Subcontractor's wastewater treatment systems design requirements. If the Subcontractor's wastewater treatment system design requires venting of specific equipment, these vents, and its controls shall be furnished by the Subcontractor. The temporary structure subcontractor will only provide the openings in the structure for any required vent piping. A flow diagram of the proposed treatment system is shown in Figure 2-1 and each unit shall consist of:

1. An oil/water separator;
2. A filtration system, and
3. A liquid phase activated carbon system.

Each oil/water separator, filtration system and liquid phase activated carbon system shall be skid mounted, and shall have a single power hook-up via a primary fused disconnect. Each unit shall



F-3
FILTER SYSTEM
TO 5 MICRON

S-1A/B/C
OIL/WATER SEPARATOR
100 GPM (EACH)

P-2A/B/C
FILTER FEED PUMPS
100 GPM (EACH)

F-1A/B/C
F-2A/B/C
DUAL FILTER BAG SYSTEM
100 GPM (EACH)
(PARALLEL OPERATION)

GAC-1A/B/C
GAC-2A/B/C
GRANULATED ACTIVATED CARBON FILTERS
100 GPM (EACH)
(SERIES OPERATION)

PREPARED BY:
FOSTER WHEELER ENVIRONMENTAL CORPORATION
470 ATLANTIC AVENUE, BOSTON, MASSACHUSETTS 02210

FIGURE 2-1

Naval Education and Training Center
Newport, Rhode Island

PROCESS FLOW DIAGRAM

SCALE: AS SHOWN | PROJ. NO. 1284.0013.0103

1284PFD1.DWG
4/16/96

include sump pumps as needed to pump the water from the influent holding tank (UST 43) to the system, transfer the water through the system at the specified rate, and pump the treated water into Foster Wheeler Environmental supplied storage tanks. The wastewater to be pumped from UST 43 is situated between an oil layer and a sludge bottom layer. As a result the Subcontractor shall position the sump pumps and associated controls such that only the water layer is removed from the UST. The elevation of UST-43 and the tank gauging report for the oil/water interface are provided in Appendices B and C, respectively.

All piping, valves and instrumentation required for proper automatic operation and system shutdown shall be provided on the skid. Instrumentation for all three treatment units shall be wired into one main control panel. The instrumentation and controls shall also be capable of receiving a high and high/high level signals from the effluent storage tank. The high level signal shall activate a warning light and the high/high level signal shall automatically shutdown the treatment system. The level controls for the effluent Frac-tank and Tank 44 shall be provided by the Subcontractor.

The Subcontractor shall provide adequate piping and valves to isolate each piece of equipment for servicing or replacement. Wastewater and treated water storage tanks will be provided by Foster Wheeler Environmental in the form of one or more Frac-tanks and/or the utilization of one of the existing USTs (UST-43 and UST-44) at Tank Farm 4. The elevation of UST-43 and UST-44 is provided in Appendix B. The Frac-tank(s) will be equipped with several 'quick-connect' connections. The Subcontractor shall provide quick-connect fittings for all influent hosing required for operation of their system. The Frac-tanks will be located in a near proximity (about 100 feet) to the skid.

The system will be operated by Foster Wheeler Environmental and operation time will be dependent on the amount of water generated during remediation of Tank Farm 4. Presently, it is anticipated that the remedial activities will require the continuous operation of the treatment system 24 hours per day, seven days per week. Treated water will be stored in effluent holding tanks prior to discharge to the local POTW.

2.3 Wastewater Treatment System Design

The Subcontractor shall be required to provide the design of the wastewater treatment system. The design shall include all equipment data, calculations, in-shop testing and drawings required to mobilize, operate, maintain and demobilize the system. The oil/water separator shall have secondary containment to prevent wastewater discharge on to the ground. The design shall include a plan for Spill Prevention, Containment and Control for the oil/water separator and a plan for Operation and Maintenance(O&M) which shall include an O&M manual.

The wastewater treatment system shall fit in an area of approximately 60 feet by 80 feet. The pumps, bag filters and carbon adsorption systems shall be placed within a temporary structure approximately 40 feet by 80 feet.

The Subcontractor shall provide sufficient instrumentation (i.e., flowmeters, level indicators, pressure gauges, etc.) and redundancy to the treatment units to insure a continuous overall system throughput of 300 gpm. Foster Wheeler Environmental will be providing operating personnel during all hours of operation. Normal maintenance and potential equipment failures shall be clearly described in the O&M Manual complete with instrumentation indication and actions to be taken to ensure a minimum amount of downtime. Any failures which could decrease the overall throughput to less than 300 gpm for more

than two (2) hours shall be identified with an estimate of duration and magnitude (gpm) of decreased throughput.

Upon award of this contract Foster Wheeler Environmental will inform the Subcontractor of the type of hosing and quick-connect equipment required for connection to the Frac-tanks and UST-44. The Subcontractor's submittals shall clearly call out all interface points and conditions (pressure, temperature, size) with sufficient specificity to insure compatibility.

The Subcontractor shall also submit a list of spare parts, local distributors and cost to replace each item during servicing of the system. The Subcontractor shall also provide a list of spare parts to be maintained on-site to minimize potential down times as well as a list of expendable parts (i.e., bag filters) to be provided.

The wastewater treatment system design is to be signed by a Registered Professional Engineer (PE) licensed to practice in the State of Rhode Island in the discipline indicated on the design drawings.

2.4 Deliverable Requirements

This section identifies the deliverables to be provided to Foster Wheeler Environmental to ensure successful completion of this project. The Subcontractor will schedule and prepare the following deliverables:

1. Health and Safety Medical Surveillance, and Training Records (where required)

2. Equipment and Materials List, Data, Spare Parts list and price, Calculations and Engineering Drawings (See Technical Specifications)

3. Activity Hazard Analyses

4. Operation and Maintenance Manual

5. Spill Prevention, Containment and Control Plan for oil/water separator

6. Warranty Information

3.0 CODES AND STANDARDS

Services furnished will be in accordance with the technical specifications and general conditions outlined in this SOW. Changes may be implemented by mutual consent in writing between the Subcontractor and Foster Wheeler Environmental. In addition to these conditions and specifications, the Subcontractor shall comply with all applicable federal, state and local ordinances, laws, and regulations. In the event of any apparent conflict among codes, standards, or this specification, the Subcontractor shall refer the conflict to Foster Wheeler Environmental for written resolution.

4.0 HEALTH AND SAFETY

All on-site activities shall be subject to the requirements of the Site Health & Safety Plan (SHSP) which will be provided to the Subcontractor upon contract award. Subcontractor personnel must meet the requirements of this plan and follow the directions of the Site Health and Safety Officer (SHSO) to protect personnel and/or the environment. Prior to initiating field activities, the Subcontractor shall

review the SHSP and certify in writing, their understanding and intent to comply with all applicable requirements. In addition, the accepted activity hazard analysis (AHA) shall be complied with by the Subcontractor during performance of the work at the Site.

Foster Wheeler Environmental will provide management and oversight for all Health and Safety activities. Foster Wheeler Environmental's SHSO will have authority to terminate the Subcontractor's field operations if the SHSO judges that the operations violate Foster Wheeler Environmental's SHSP.

The Subcontractor will be required to comply with all applicable OSHA (1910 and 1926) safety and health standards in addition to the requirements of the Foster Wheeler Environmental SHSP. All Subcontractor employees will be required to attend a Site-Specific Safety and Health Training session prior to mobilization on the site and daily (~ 20 minutes) health and safety briefings. No intrusive work is expected during aboveground installation of the treatment system skids therefore, on-site personnel performing this activity will not be required to have OSHA 40-hour Hazardous Waste Site (HAZWOPER) Training. However, all Subcontractor personnel are required to meet with the SHSO before entering the site, and documentation of successful completion of HAZWOPER and Confiuned Space Entry Training will be required for those personnel who will be installing the sump pumps or servicing the system once operations begin. Documentation will include current refresher training, and enrollment in a medical monitoring program in accordance with 29 CFR 1910.120.

5.0 RESPONSIBILITIES OF THE SUBCONTRACTOR

5.1 Subcontract Services

The work shall include, but not be limited to, providing supervision, labor, materials, equipment and support facilities necessary to mobilize, service, decontaminate and demobilize the wastewater treatment system as described in this Statement of Work and included in the Technical Specifications. The Subcontractor will be required to cooperate with other construction efforts that will be performed by others concurrently on-site.

The work shall also include servicing of the wastewater treatment system units at any time during its operation on-site. This service will include response within 24-hours of notification of system break-down. The Subcontractor shall provide one (1) set of spare parts to be stored on site with the treatment system for quick replacement and nine months worth of expendable parts.

5.2 Training

The Subcontractor shall provide a representative for training during start-up. Training shall be for one eight hour day of system operation.

5.3 Mechanical Testing

Prior to start-up, the treatment system shall be hydrostatically tested for leaks at 150 % of the maximum operating pressure.

During training, the wastewater treatment units will each be operated at design flows, using non-contaminated water (to be supplied by Foster Wheeler Environmental), for a continuous 2 hour period (approximately 36,000 gallons) to show proper operation of mechanical equipment. During training the

system will also be tested to confirm that the effluent from each unit meets the criteria specified in the Technical Specification when processing the contaminated waters and that an overall throughput of 300 gpm can be sustained.

5.4 Decon of Equipment (Prior to Arrival)

All non-disposable tanks, piping, hoses, pumps, and treatment equipment shall be decontaminated by the Subcontractor prior to use at the site. The Subcontractor shall verify in writing that all equipment is new or has been decontaminated prior to its arrival at the site. All equipment shall be free of liquid at arrival to the site.

5.5 Waste Collection

The Subcontractor shall keep the work site and adjacent area as free of debris and rubbish as is practicable during mobilization, servicing and de-mobilization. All waste products generated during the initial start-up of the wastewater treatment operation, including sludges, solids, decontamination fluids, and used personal protective equipment (PPE) shall be segregated and containerized in DOT-approved drums provided by Foster Wheeler Environmental. The drums shall be labeled to indicate media, date of collection and origin of the material. All waste products generated during servicing will also be drummed. Foster Wheeler Environmental will be responsible for disposal of drummed material. The Subcontractor shall be responsible for the disposal and/or regeneration of all granulated activated carbon.

5.6 Quality Control

The Subcontractor shall perform high quality work in accordance with the referenced technical specifications and all other permits or applications required. All field activities shall be conducted in an efficient and professional manner with minimal damage to the environment.

To ensure that the Subcontractor performs high-quality work in accordance with specifications, the Foster Wheeler Environmental Quality Control Manager will inspect the work at completion and periodically inspect the system during operation. Any discrepancies will be noted by Foster Wheeler Environmental and will be provided to the Subcontractor in writing by the end of the following work day. The Subcontractor shall be responsible for addressing the discrepancies. The Subcontractor shall be responsible for any adjustments or repairs required for proper operation of the wastewater treatment system.

5.7 Permits

The Subcontractor shall be responsible for informing Foster Wheeler Environmental of all federal, state and local requirements for design and installation of the wastewater treatment system and securing all required permits. All federal, state and local permits required for operation of the treatment system will be secured by Foster Wheeler Environmental.

5.8 Equipment Decon and Waste Disposal

Equipment that has come into contact with contaminated wastewater during operation of the treatment system shall be decontaminated, by the Subcontractor, following completion of the project and prior to transportation off-site. Subcontractor shall decontaminate equipment in a manner which minimizes waste generation, and such that all water is treated in the system. Foster Wheeler Environmental will provide

storage, transportation and disposal for waste, both solid and liquid, produced on the site. However, the Subcontractor shall be responsible for the disposal and/or regeneration of granular activated carbon.

6.0 RESPONSIBILITIES OF FOSTER WHEELER ENVIRONMENTAL

6.1 Site Access

Access to all locations will be arranged by Foster Wheeler Environmental prior to commencement of work. No Subcontractor personnel and equipment are to enter any location without first obtaining clearance from Foster Wheeler Environmental.

6.2 Review of Design

Foster Wheeler Environmental will review the design submitted by the Subcontractor and provide comments. The Subcontractor will be required to incorporate the comments into subsequent submittals, or to resolve comments with Foster Wheeler Environmental prior to final acceptance.

6.3 Utilities

Foster Wheeler Environmental will provide 460 volt, 3-phase electrical power to the site and all other utility hook-ups, as indicated by the Subcontractor in the wastewater treatment system design submittal, and will be responsible for all utility operating costs. Interior and exterior lighting needed during operation of the treatment system will also be provided by Foster Wheeler Environmental.

6.4 Site Preparation

Foster Wheeler Environmental will provide the treatment pad and temporary structure. The treatment pad will be constructed prior to mobilization of the treatment system and will consist of crushed stone with geotextile and high density polyethylene liners beneath. The perimeter of the treatment pad will also be bermed by continuing the liners over staked hay bales to contain potential spills.

6.5 Security

The treatment system will be located within a fenced area. However, the Subcontractor shall be responsible for securing equipment, tools and material associated with the water treatment system during installation.

6.6 Temporary Facilities

The Subcontractor will be provided with access to a telephone (local calls only), use of a fax machine and photocopying machine during mobilization, servicing and de-mobilization of the wastewater treatment system. Portable toilets shall also be provided by Foster Wheeler Environmental.

6.7 Operation of System

Foster Wheeler Environmental shall be responsible for the operation of the Wastewater Treatment System. Only Foster Wheeler Environmental personnel trained on-site by the Subcontractor will operate the wastewater treatment system.

7.0 SCHEDULE

It is anticipated that the Wastewater Treatment System subcontract will be awarded on or about May 7, 1996. Demobilization of the system is anticipated in January 1997.

The following milestones must be met.

1. Complete and submit the wastewater treatment design, which shall include the Activity Hazard Analysis and the Spill Prevention, Containment, and Control and Operation and Maintenance plans within two weeks of the receipt of a written notice to proceed from Foster Wheeler Environmental.

2. The design will be reviewed by Foster Wheeler Environmental personnel and will be returned to the Subcontractor within one week. The comments are to be addressed and a final submittal package shall be submitted for acceptance within one week of receipt of Foster Wheeler Environmental's comments.

3. The treatment system shall be mobilized and fully operational within four weeks following final submittal package acceptance by Foster Wheeler Environmental. The Subcontractor shall certify that the system is fully operational prior to commencement of field treatment activities.

4. Decontamination and demobilization shall be completed within two (2) weeks of notification by Foster Wheeler Environmental.

8.0 MEASUREMENT AND PAYMENT

The work shall be measured and paid in accordance with the payment tasks included herein and the submitted breakdown provided in the Price Quotation Form. The following payment tasks have been identified:

1. Receipt and acceptance of all submittals required by SOW paragraph 2.4, including the complete design submittal for wastewater treatment system, including calculations, and bearing the stamp and seal of Professional Engineer(s) licensed to practice in Rhode Island.

2. If renting/leasing system - Final Payment upon complete demobilization and removal of wastewater system from the site. Assume 3 treatment units for 7 months.

   Lease term shall commence upon successful mobilization and proof of operation. Lease term shall terminate upon notification by Foster Wheeler Environmental for Subcontractor to decontaminate and demobilize the unit(s).

3. Mobilization, and successful testing and start-up operation of wastewater treatment system on-site and described in SOW paragraphs 5.1, 5.2 and 5.3.

4. Service costs for periodic servicing of equipment and replacement of parts as described in SOW paragraph 5.1. Assume 3 treatment units for 7 months.

5. Training of Foster Wheeler Environmental personnel as described in SOW paragraphs 5.2 and 5.3.

6. Cost of recharging/replacing activated carbon (including disposal or regeneration). Assume one carbon vessel/month/unit for 7 months.

7. Decontamination and demobilization of the wastewater treatment system in accordance with Section 5.8 - Equipment Decon and Waste Disposal.

Option:

8. If exercising the purchase option for treatment system - Payment for equipment upon successful operation of system for a period of 60 days, meeting discharge criteria for purchase agreement.

APPENDIX A

TECHNICAL SPECIFICATIONS

TECHNICAL SPECIFICATION
FOR
WASTEWATER TREATMENT SYSTEM

1.1 SYSTEM DESCRIPTION

The Wastewater Treatment System will treat wastewater generated from remedial activities associated with the closure of underground storage tanks (USTs). These activities include material removal, cleaning and repair. The system will consist of three (3) identical, individually operated wastewater treatment units, operated in parallel, which will each feed from an existing UST (UST-43). The pumps will be required to pump the water through the system at a rate of 100 gallons per minute (gpm) per treatment unit, for a total design flowrate of 300 gpm for the complete system.

The wastewater treatment units shall each consist of an oil-water separator; a filter system consisting of bag filters; and a liquid phase activated carbon unit. Each treatment unit shall be mounted on skids and shall be able to be easily moved by fork-lift and/or truck (no cranes). The oil/water separators are to be located outdoors while the pumps, bag filter systems, and carbon adsorption systems are to located within a temporary structure. **The Subcontractor is encouraged to provide a standard unit alternative, if available.**

The treated effluent will be stored in storage tanks located in close proximity (150 foot radius) to the treatment system.

1.2 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 395	(1988) Specification for Ferritic Ductile Iron Pressure-Retaining Castings for Use at Elevated Temperatures

AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME)

ASME B 16.1	(1989) Cast Iron Pipe Flanges and Flanged Fittings
ASME B 16.5	(1988; Errata) Pipe Flange and Flanged Fittings

ANTI-FRICTION BEARING MANUFACTURERS ASSOCIATION, INC. (AFBMA)

AFBMA 11	(1990) Load Ratings and Fatigue Life for Roller Bearings
AFBMA 9	(1990) Load Ratings and Fatigue Life for Roller Bearings

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

NEMA MG	(1987) Rev. 1 Motors and Generators
NEMA ICS 6	(1988) Rev. 1 Enclosures for Industrial Control and Systems

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70 (1996.3) National Electric Code

HYDRAULIC INSTITUTE (HI)

HI-01 (1983; 14th Ed) Standards for Centrifugal, Rotary and Reciprocating Pumps

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS, INC.

IEEE 100 (1988) Dictionary of Electrical and Electronics Terms

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI C2 (1993) National Electrical Safety Code

AMERICAN PETROLEUM INSTITUTE (API)

American Petroleum Institute Manual on Disposal of Refinery Wastes, Volume on Liquid Wastes, Chapter 5 - Oil Water Separator Process Design

UNDERWRITERS LABORATORIES INC. (UL)

UL 58 Standard for Safety

1.3 DESIGN REQUIREMENTS

1.3.1 Application

The process stream shall undergo oil/water separation, filtration and carbon adsorption to remove total suspended solids and organics before the water is discharged to the local POTW. The oil/water separator will be fully enclosed.

1.3.2 Operation

The units shall be designed for continuous operation (24 hours per day, 7 days per week). Under normal operation, water will be pumped at a rate of 100 gpm through each treatment train consisting of an oil/water separator, a filtration system, and liquid phase carbon adsorption units. The liquid phase carbon adsorption units for each unit will be operated in series.

1.3.3 General Requirements

The Subcontractor shall assume full responsibility for the suitability, adequacy and safety of the design, construction and performance of the system specified herein. The oil/water separator, filtration system (bag), and carbon adsorption units shall be selected and designed to yield satisfactory hydraulic and mechanical performance for the service conditions specified herein. It is not the intent of the specification to completely specify all the details of design and fabrication. All systems are to be provided with accessories and features that are consistent with the Subcontractor's standard practices, when such practices do not conflict with this specification. In addition, the equipment is to conform to accepted industry standards with respect to design and workmanship. Sufficient instrumentation shall

be provided to ensure operator's ability to assess the hydraulic parameters of each component of the system.

All systems shall be designed for service in an indoor chemical plant type environment or weatherproof environment and shall be suitable for start-up and operation at the conditions specified. All units shall be shipped with an initial material (i.e. virgin carbon, filtration bags) and be ready for installation and operation. The system shall be delivered with one set of spare parts and nine months of expendable parts.

1.3.4 Influent Characteristics (per treatment train, 3 total)

Design Flow Rate, gpm (max)	100
Temperature, F	50-90
pH	6.5-8.0
Total dissolved solids, ppm	183 - 5,560 *
Total suspended solids, ppm	<1.0 - 94 *
Oil & Grease , ppm	2.2 - 93
Chemical Oxygen Demand (COD), ppm	28 - 1,330
Biological Oxygen Demand (BOD), ppm	36 - 206
Total Toxic Organics, ppm	3.0*

* Based on analytical data from Tank Farm 5 which is summarized in Tables 1 and 2. Similar materials (No. 2 and No. 6 fuel oils) were stored at Tank Farms 4, therefore it is anticipated that Tank Farm 4 water will have similar characteristics to the water at Tank Farm 5. Analytical data for Tank Farm 4 will be provided once it becomes available.

1.3.5 Effluent Goals **

Total Suspended Solids, ppm	285
Chemical Oxygen Demand (COD), ppm	230
Biological Oxygen Demand (BOD), ppm	230
Total Toxic Organics (TTO), ppm	2.0
Oil & Grease, ppm	25
Temperature	<104 °F
pH	5.0 - 10.0

** Based on POTW acceptance criteria which was established for the remediation of Tank Farm 5. Effluent goals for Tank Farm 4 will be provided once they become available.

1.4 SUBMITTALS

SD-02 Manufacturer's Catalog Data

a. Pumps
b. Oil/water separator
c. Filtration System
d. Liquid Phase Carbon Adsorption Units
e. Instrumentation and Valves
f. Hoses and Quick-connection equipment

SD-04 Shop/Fabrication Drawings

Submit shop drawings for all system units: arrangement drawing(s) with dimensions, operating materials specifications (i.e. carbon, filter bags), materials of construction, flow-pressure drop curves, leak test procedures, mounting/installation details, tie-in connections with locations, equipment dry and operating weight, electrical schematics, wiring diagrams, and flow schematics. Electrical and electronic terms used in the drawings shall be as defined in IEEE 100.

SD-05 Design Data

Submit design analysis and calculations supporting:

a. Pumps - catalog pump curves (gallons per minute versus total head in feet)
- equipment nameplate data, including motor information (full-load)

b. Oil/water separator - Sizing and hydraulic loading

c. Filtration System -Bag filter: selection of filter element, flow capacity, pressure drop, permeability, and support basket open area

d. Carbon Adsorption Units - selection of carbon type and capacity, carbon usage, bed depth, carbon loading, flow capacity and pressure drop

e. Hydraulic profile for the entire system

f. Electrical Load requirements - Normal and peak for the system (volts and amps)

SD-09 Reports

Test report for the filtration and carbon adsorption units shall be submitted on the following tests:

a. Functional Tests
b. Hydrostatic/Leakage Tests

SD-19 Operation and Maintenance Manual

Submit five (5) copies of operation and maintenance (O&M) data/manuals which are specially applicable to this system and a complete and concise depiction of the provided equipment and overall system operation. Present information in sufficient detail to clearly explain O&M requirements at the system, equipment, component, and subassembly level. Include an index for the O&M manuals..

1.5 TESTING

All system units and interconnecting piping shall be hydrostatically tested at 150% of the maximum operating pressure.

PART 2 PRODUCTS

2.1 CENTRIFUGAL PUMPS

2.1.1 Design Requirements

Each pump and motor unit shall be supplied, mounted on a common baseplate and frame. All pumps shall be designed to meet the required flow rate (100 gpm) and head pressure required for selected equipment and shall be a completely assembled and ready for operation, inclusive of external piping, wiring and controls.

Pumps shall be of a proven type suitable for the process and ambient conditions.

Pumps shall be selected at a point within the maximum efficiency for a given impeller and casing combination.

Pumps shall not have impeller diameters larger than 90 percent of the published maximum diameter of the casing or less than 15 percent larger than the published minimum diameter of the casing. Pump casing shall be adequately sized to permit substitutions of larger diameter impeller to achieve a 10% increase in head at rated capacity.

Required net positive suction head (NPSH) for the largest diameter impeller useable with each casing design shall not exceed the available suction conditions calculated by the Subcontractor.

Pumps shall be suitable for operation at indoor and outdoor temperatures without vapor binding and without cavitation under any system operating condition. The only acceptable means of rectification of cavitation shall be replacement of entire pump assembly.

Available NPSH shall exceed required NPSH by not less than 1.5 feet.

2.1.2 General Pump Requirements

This specification includes design, construction, installation, and performance features of self priming centrifugal pumps. Pumps provided shall conform to HI-01 standards for centrifugal pumps, and to requirements specified herein. Each pump assembly shall be provided as a complete factory assembled unit including pump, motor, couplings and coupling guards on a common baseplate.

2.1.3 Classification

Horizontal shaft, split-case, single-stage, end-suction, single volute, centrifugal type.

2.1.4 Casing

Pump casings shall be ductile cast iron per ASTM A 395 with a design working pressure of not less than 185 pounds per square inch gage (psig) at 100 degrees F. Cast iron casings shall be single volute with flanged piping connections conforming to ASME B 16.1, Class 125. Ductile cast iron casings shall have 150 lb. FF flanged end connections per ASME B 16.5. The direction of shaft rotation shall be conspicuously indicated. The casing shall have a tapped opening for draining at a low point in the casing. Drain openings in the volute, intake, or other passages capable of retaining trapped fluid shall be located in the low point of such passages.

2.1.5 Impellers

Impellers shall be enclosed design, stainless steel. Impellers shall meet maximum and minimum diameter requirements. Impellers may be either one-piece construction or assemblies. When assembled impellers are supplied, whether welded or mechanically joined, Manufacturer shall provide data to demonstrate the integrity of the impeller at maximum pump speed and flow. Mechanically joined impeller assemblies shall have positive features to prevent loosening of the fasteners from vibration.

2.1.6 Balancing

When the pump is installed on its permanent baseplate, the magnitude of vibration shall not exceed 0.002 inches. The pump shall operate smoothly throughout its range in reaching the operating speed.

2.1.7 Wearing Rings

Wearing rings shall be of suitable composition for the intended service. Wearing rings shall be provided in every pump case and on all impellers larger than 7 inches in diameter.

2.1.8 Shaft

Shafts for mechanical-seal service shall be solid or sleeved and all materials shall be compatible with the fluids handled. Shafts shall be of adequate strength to withstand the maximum torque which can be transmitted by the motor driver. If shaft sleeves are provided, no leakage between the sleeve and shaft is permitted. Sleeves, if provided, shall be field replaceable. Pressed-fitted sleeves are not acceptable. Guards shall also be provided per OSHA requirements.

2.1.9 Mechanical Seals

Mechanical seal arrangement shall prevent leakage of the pumped fluids to the atmosphere under all normal operating conditions.

The seals shall be selected for severe duty for the type of fluid to be pumped and the concentrations of solids which are expected to exist. The inner seal shall be located as close to the inside of the pump casing as possible, and casing design shall provide sufficient space to allow solids to clear away from the area near the inner seal face. The flushing liquid openings in either the stuffing box or gland shall be arranged to direct flushing liquid at the seal faces.

Mechanical seals shall be balanced or unbalanced, as necessary to conform to specified service requirements. Mechanical seals shall be constructed in a manner and of materials particularly suitable for the temperature service range and fluids handled.

Seal construction shall not require external source cooling for pumped-fluid service temperatures up to 250 degrees F.

Seal pressure rating shall be suitable for maximum system hydraulic conditions.

Materials of construction shall be suitable for the fluids handled.

2.1.10 Bearings and Lubrication

Bearings shall be heavy-duty ball or roller type with full provisions for the mechanical and hydraulic radial and thrust loads imposed by any normal service condition. Bearings shall be manufactured from

vacuum-degassed or processed-alloy steel. Bearings shall have an L-10 rated life of not less than 30,000 hours or an average life of 150,000 hours in accordance with AFBMA 9 or AFBMA 11.

Bearings shall be grease lubricated and shall be provided with grease supply and relief fittings located at bottom of bearings.

Bearing housings shall be cast iron, self-aligning on metal-to-metal surfaces and shall totally enclose bearings. The support under the outboard end of the bearing housing, if used, shall allow axial thermal expansion and contraction without imposing stress on the housing.

2.1.11 Flexible Coupling

Pump shaft shall be connected to the motor shaft through a flexible coupling. The flexible member shall be a tire shape in shear, or a solid-mass serrated-edge disk shape made of chloroprene materials and retained by fixed flanges. Flexible coupling shall act as a dielectric connector and shall not transmit sound, vibration, or end thrust.

All couplings in intermittent on/off service shall have couplings selected on the basis of a 2.0 service factor. Other service factors shall be in accordance with the manufacturer's instructions. Provide OSHA approved coupling guard.

2.1.12 Baseplate

Pump and driver shall be mounted on a fabricated steel base constructed of a rolled structural-steel perimeter frame, reinforced and cross-braced internally with pipe or rolled structural members, capped with 1/4 inch steel plate, and provided with adequate drip rim and drain tapping. Alternately, the Subcontractor may submit for approval a formed or bent steel baseplate.

2.1.13 Motors

Each electric motor-driven pump shall be driven by a totally-enclosed fan cooled continuous-duty electric motor. Motor shall have a 1.15 service factor. Motors shall be high efficiency type, squirrel-cage induction motors having normal-starting-torque and low-starting-current characteristics, and shall be of sufficient size so that the nameplate horsepower rating will not be exceeded throughout the entire published pump characteristic curve. Motor bearings shall provide smooth operations under the conditions encountered for the life of the motor. Adequate thrust bearing shall be provided in the motor to carry the weight of all rotating parts plus the hydraulic thrust and shall be capable of withstanding upthrust imposed during pump starting and under variable pumping head conditions specified. Motors shall be rated 460 VAC. All motors shall be 3 phase, 60 Hz, 1800 RPM (unless otherwise noted) and such rating shall be stamped on the nameplate. Class F insulation with a class B temperature rise at 40 degrees C ambient. Motors shall conform to NEMA MG 1 and be UL Listed.

2.1.14 Painting

Provide manufacturer's standard finish on all centrifugal pump assemblies. Stainless or alloy steel components shall not be painted.

2.1.15 Design Requirements

Pump capacity design requirements and characteristics calculated by the Subcontractor and not specific herein shall be documented and submitted to Foster Wheeler Environmental.

2.1.16 Noise

Centrifugal pump assemblies shall be designed, constructed and installed to operate at a noise level not to exceed 85 dba at 3 feet under any load operating conditions. The Subcontractor shall damp all pumps, motors, and fans where possible in order to reduce noise transmissions.

2.2 SUMP PUMPS

2.2.1 Design Requirements

All pumps shall be designed to meet the required flow rate (100 gpm) and head pressure required for selected equipment and shall be a completely assembled and ready for operation, inclusive of external piping, wiring and controls.

Pumps shall be of a proven type suitable for the process and ambient conditions.

Pumps shall be installed through a 12 foot by 12 foot opening in the top of UST 43 which will be provided by Foster Wheeler Environmental. A Gantry Crane system will also be provided by Foster Wheeler Environmental to install, support and adjust elevations of the sump pumps installed within UST-43.

2.2.2 General Pump Requirements

This specification includes design, construction, installation, and performance features of submersible centrifugal pumps. Pumps provided shall conform to HI-01 standards for centrifugal pumps, and to requirements specified herein. Each pump assembly shall be provided as a complete factory assembled unit including pump, motor, couplings and coupling guards on a common baseplate.

2.2.3 Materials of Construction

Submersible pumps shall be constructed of materials suitable for the service and conditions intended.

2.2.4 Impellers

Impellers shall be enclosed design, stainless steel. Impellers shall meet maximum and minimum diameter requirements. Impellers may be either one-piece construction or assemblies. When assembled impellers are supplied, whether welded or mechanically joined, Manufacturer shall provide data to demonstrate the integrity of the impeller at maximum pump speed and flow. Mechanically joined impeller assemblies shall have positive features to prevent loosening of the fasteners from vibration.

2.2.5 Balancing

When the pump is installed on its permanent baseplate, the magnitude of vibration shall not exceed 0.002 inches. The pump shall operate smoothly throughout its range in reaching the operating speed.

2.2.6 Wearing Rings

Wearing rings shall be of suitable composition for the intended service. Wearing rings shall be provided in every pump case and on all impellers larger than 7 inches in diameter.

2.2.7 Shaft

Shafts for mechanical-seal service shall be solid or sleeved and all materials shall be compatible with the fluids handled. Shafts shall be of adequate strength to withstand the maximum torque which can be transmitted by the motor driver. If shaft sleeves are provided, no leakage between the sleeve and shaft is permitted. Sleeves, if provided, shall be field replaceable. Pressed-fitted sleeves are not acceptable. Guards shall also be provided per OSHA requirements.

2.2.8 Mechanical Seals

Mechanical seal arrangement shall prevent leakage of the pumped fluids under all normal operating conditions.

The seals shall be selected for severe duty for the type of fluid to be pumped and the concentrations of solids which are expected to exist. The inner seal shall be located as close to the inside of the pump casing as possible, and casing design shall provide sufficient space to allow solids to clear away from the area near the inner seal face. The flushing liquid openings in either the stuffing box or gland shall be arranged to direct flushing liquid at the seal faces.

Mechanical seals shall be balanced or unbalanced, as necessary to conform to specified service requirements. Mechanical seals shall be constructed in a manner and of materials particularly suitable for the temperature service range and fluids handled.

Seal construction shall not require external source cooling for pumped-fluid service temperatures up to 250 degrees F.

Seal pressure rating shall be suitable for maximum system hydraulic conditions.

Materials of construction shall be suitable for the fluids handled.

2.2.9 Bearings and Lubrication

Bearings shall be heavy-duty ball or roller type with full provisions for the mechanical and hydraulic radial and thrust loads imposed by any normal service condition. Bearings shall be manufactured from vacuum-degassed or processed-alloy steel. Bearings shall have an L-10 rated life of not less than 30,000 hours or an average life of 150,000 hours in accordance with AFBMA 9 or AFBMA 11.

Bearings shall be grease lubricated and shall be provided with grease supply and relief fittings located at bottom of bearings.

Bearing housings shall be cast iron, self-aligning on metal-to-metal surfaces and shall totally enclose bearings. The support under the outboard end of the bearing housing, if used, shall allow axial thermal expansion and contraction without imposing stress on the housing.

2.2.10 Motors

Each electric motor-driven pump shall be driven by a totally-enclosed fan cooled, explosion proof, continuous-duty electric motor. Motor shall have a 1.15 service factor. Motors shall be high efficiency type, squirrel-cage induction motors having normal-starting-torque and low-starting-current characteristics, and shall be of sufficient size so that the nameplate horsepower rating will not be exceeded throughout the entire published pump characteristic curve. Motor bearings shall provide smooth operations under the conditions encountered for the life of the motor. Adequate thrust bearing shall be provided in the motor to carry the weight of all rotating parts plus the hydraulic thrust and

shall be capable of withstanding upthrust imposed during pump starting and under variable pumping head conditions specified. Motors shall be rated 460 VAC. All motors shall be suitable for Class 1, Division 1, 3 phase, 60 Hz, 1800 RPM (unless otherwise noted) and such rating shall be stamped on the nameplate. Class F insulation with a class B temperature rise at 40 degrees C ambient. Motors shall conform to NEMA MG 1 and be UL Listed.

2.2.11 Painting

Provide manufacturer's standard finish on all centrifugal pump assemblies. Stainless or alloy steel components shall not be painted.

2.2.12 Design Requirements

Pump capacity design requirements and characteristics calculated by the Subcontractor and not specific herein shall be documented and submitted to Foster Wheeler Environmental.

2.3 OIL/WATER SEPARATOR

2.3.1 Design Requirements

The system shall be fully enclosed and the separating chamber shall be properly sized for 100 gpm and engineered in strict accordance to Chapter 3 and 5 of API Manual on Disposal of Refinery Wastes, Volume on Liquid Wastes, Oil-water Separator Process Design.

2.3.2 Components

2.3.2.1 Material of Construction

The oil water separator shall be fabricated from prime grade carbon steel as required by Standard UL-58. The separator shall be cylindrical and thickness shall be in accordance with UL-58.

2.3.2.2 Design Requirements

The oil water separator shall have an integral oil storage capacity of 40% of the total separator volume. The separator shall be designed in a manner to minimize solid build-up in the oil-water separator chamber, which could reduce the oil-water separation of the unit. The separator shall also be designed to be fully enclosed.

2.4 FILTER SYSTEM

2.4.1 Bag Filter

2.4.1.1 Design Standards

Bag filters shall be designed and constructed to meet the following standards:

Flow Capacity	100
Pressure Rating, psig	*
Clean Bed Pressure Drop, psi	*
Maximum Allowable Pressure Drop, psi	*
Total Filter Area sq. Ft.	*
Inlet/Outlet Connection, Size/Rating	*

Drain Connection, Size/Rating	*
Number of Bag/Basket Assemblies	2
Inner Bag	*
Bag Size Number	*
Smallest Particle Size Retained, microns	20
Surface Area, sq. ft.	*
Basket Open Area	*
Basket Perforation Size, in.	*

* To be determined by Subcontractor to meet the effluent criteria specified.

2.4.1 2 Type

Provide dual stage bag filters consisting of an inner filter bag and support basket mounted within another filter bag and support basket. Both the filter bag/support basket assemblies shall be contained within a common housing. Bag filters shall not be backflushable type.

2.4.1.3 Components

2.4.1.3.1 Housings

Provide vertical cylindrical type housings of carbon steel construction. Housings shall be designed and constructed in accordance with ASME Boiler and Pressure Vessel Code Section VIII, Unfired Pressure Vessels, per manufacturer's standard, but in no case less than 30 psig design at 120 F. Housings shall be spot radiographed and code stamped. Housings shall be furnished with dished bottom head. Top of housing shall be furnished with flat O-Ring gasketed cover secured by three eyenut assemblies. One of the eyenut assemblies shall serve as a hinge when the cover is opened. Housings shall be furnished with an O-Ring seal between the rim of the outer basket and housing inside diameter to prevent fluid bypass around the basket. Housings shall be equipped with flanged side inlet and outlet connections, 150 lb flat faced per ANSI B16.5. Provide separate bottom drain connection. All internal surfaces of housings shall be coated with two coats of coal tar epoxy 4-6 mils DFT each. Surface preparation and application shall be per manufacturer's recommendations.

2.4.1.3.2 Filter Elements

Provide inner and outer micron rated filter bags of polyethylene material. Bags shall be designed and constructed to retain solids of size greater than and including size stipulated in Paragraph 2.4.1.1. The Subcontractor shall be solely responsible for selection of suitable bag construction to meet the conditions stipulated herein.

2.4.1.3.3 Support Baskets

Provide heavy duty inner and outer support baskets. Baskets shall be sized by Subcontractor to suit the housings and filter bags selected. Baskets shall also have open area compatible with the filter bags selected. Subcontractor shall be responsible for selection of suitable basket construction to meet the service conditions specified herein. Baskets shall be equipped with a hinged bail handle to facilitate ease of removal and cleaning. Bail handle shall be pushed down by the closed housing cover to hold the basket against a positive stop in the housing, thereby preventing bypassing of unfiltered liquid. Support baskets shall be constructed of stainless steel.

2.4.1.3.4 Accessories

Provide bag filter housing cover with 1/4 in. NPT for air purge. Provide each filter vessel with a pressure relief valve adequately sized to provide 10% overpressure at filter rated flow capacity or greater if required by pump selected.

2.5 LIQUID PHASE CARBON ADSORPTION

2.5.1 Design Standards

Liquid phase carbon adsorption unit(s) shall be designed and constructed to meet the following standards:

Flow Capacity, gpm	100
Clean Pressure Drop	
@ Flow Capacity, psi	*
Design Temperature, F	*
Design Pressure, psig	*
Maximum Operating Pressure, psig	*
Adsorbent Capacity, lbs.	*
Adsorbent Usage, lbs/day	**
Minimum Contact Time, sec	*
Dimensions (diameter x height) in	*
Shipping Weight, lbs.	*

* To be determined by Subcontractor to meet the effluent criteria specified.

** Based on influent characteristics and effluent goals provided in Paragraphs 1.3.4 and 1.3.5, respectively

2.5.2 Vessels

Provide vertical cylindrical type housings of carbon steel construction. Housings shall be designed and constructed in accordance with ASME Boiler and Pressure Vessel Code Section VIII, Unfired Pressure Vessels, per manufacturer's standard. Housings shall be spot radiographed and code stamped.

Vessels shall be equipped with internals designed to permit even flow distribution for full adsorbent utilization and peak removal efficiency without channeling. Vessels shall be furnished with opening(s) to permit access to interior for maintenance or inspection. Vessels shall be DOT rated acceptable for shipment of hazardous spent carbon. Provide separate threaded connections for inlet and outlet, drain and air release. Provide each carbon vessel with a pressure relief valve adequately sized to provide 10% overpressure at the rated flow capacity or greater if required by pump selected.

2.5.3 Adsorbent Media (Activated Carbon)

Provide virgin grade granular activated carbon manufactured from bituminous coal. Subcontractor shall be responsible for selection of suitable quantity and bed depth of carbon and shall advise changeout frequency based upon the process condition stipulated in this specification.

2 6 MATERIALS OF CONSTRUCTION

Unless otherwise stipulated herein, wetted parts of all components shall be compatible with fluids handled. All other materials of construction shall be the Subcontractor's standard for the intended service.

2.7 ELECTRICAL REQUIREMENTS

Interior and exterior lighting to be provided by Foster Wheeler Environmental Corporation.

Equipment, materials, installation, and workmanship shall be in accordance with the mandatory and advisory provisions of NFPA 70.

Electrical equipment in UST-43 and associated access vault shall be suitable for NEC Class 1, Division 1. Other area electrical equipment shall meet area classifications as required by Subcontractor's system design.

Provide internal wiring for components as an integral part of the system. System power hook-up shall be through one primary fused disconnect line, 3 phase, and 460 volts.

Provide motor starters, step down transformer (if required) and control panel.

Provide electric heat tracing if required during cold weather operation.

2.8 SPECIAL TOOLS

Provide (if any) special tools required for installation or maintenance.

2.9 PAINTING

Structural steel and external surfaces of vessels shall be given corrosion resistant finish per Subcontractor's standard. Stainless steel components shall not be painted.

2.10 LABELING

Subcontractor shall clearly label all vessels and piping associated with the treatment system for quick identification.

2.11 SPARE PARTS

Provide one set of spare parts to be stored on site for quick replacement, and nine (9) months worth of expendable parts. At a minimum, one spare of each piece of rotating equipment shall be stored on-site.

PART 3 EXECUTION

3.1 INSTALLATION

Install all equipment on skid(s) which can be moved by fork lift or truck (no cranes) as indicated on the Subcontractors submitted and approved drawing(s) and in accordance with the manufacturer's installation instructions

Electrical installations shall conform to ANSI C2, NFPA 70 and requirements specified herein

3.2 FIELD QUALITY CONTROL

Administer, schedule, conduct and document specified inspections and tests. Furnish personnel, instruments and equipment as necessary for such inspection and testing. Correct defects and repeat the respective inspections and tests.

3.2.1 Inspection

Prior to initial operation, inspect equipment installation for conformance with drawings and specifications. If bolted covers are provided, inspect to insure they are securely fastened per manufacturer's instructions. Air purge vessels prior to initial operation.

3.2.2 Alignment

Pump and driver shall be aligned to manufacturer's maximum permissible tolerance, but in no case shall angularity exceed 0.5 degree nor shall parallel misalignment exceed 0.002 inch. Pump alignment shall be performed under the direction of the manufacturer's representative.

Prior to pump final acceptance the Subcontractor shall submit documentation that the pump and motor are aligned and specified and that the pump will satisfactorily operate over the specified range.

3.2.3 Testing

The Subcontractor in the presence of the Contractor shall hydro- and pressure-test the entire system (including any flexible hosing(with clean water at 150% of the maximum operating pressure prior to system operation.

--END OF SECTION--

SECTION 15060

PLASTIC PIPE, FITTINGS AND VALVES

PART 1 GENERAL

1.2 REFERENCES

The publications listed below form a part of this section to the extent referenced:

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI B16.5 - 1988Pipe Flanges and Flanged Fittings

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A193	Alloy-Steel and Stainless Steel Bolting Materials for High Temperature
ASTM A194	Carbon and Alloy Steel Nuts for Bolts for High Pressure and High Temperature Service
ASTM D 1527	(1989) Standard Specification for Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe, Schedules 40 and 80
ASTM D 1784	(1990) Standard Specification for Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds
ASTM D 1785	(1991) Standard Specification for Poly (Vinyl Chloride) (PVC), Plastic Pipe, Schedules 40, 80, and 120
ASTM D 2235	(1988) Standard Specification for Solvent Cement for Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe and Fittings
ASTM D 2464	(1990) Standard Specification for Threaded Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80
ASTM D 2467	(1990) Standard Specification for Socket-Type Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80
ASTM D 2564	(1991) Standard Specification for Solvent Cements for Poly(Vinyl Chloride) (PVC) Plastic Pipe and Fittings
ASTM D 2855	(1990) Standard Practice for Making Solvent-Cemented Joints with Poly(Vinyl Chloride) (PVC) Pipe and Fittings
ASTM F152	
ASTM F 437	(1989b) Standard Specification for

	Threaded Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 80
ASTM F 439	(1990) Standard Specification for Socket-Type Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 80
ASTM F 441	(1989) Standard Specifications for Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 80
ASTM F 442	(1989) Standard Specification for Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe (SDR-PR)

1.4.1 Manufacturer's Catalog Data

a. Plastic Pipe, Fittings and Valves

1.4.2 SD-04 Drawings

Installation drawings for Plastic Piping Systems shall be submitted with the other drawings and shall be in accordance with the paragraph entitled, "Installation," of this section. Installation drawings shall be based on the equipment and instrumentation actually provided.

1.4.3. Test Procedures

PART 2 PRODUCTS

2.1 POLYVINYLCHLORIDE (PVC) PIPE

PVC pipe shall be in accordance with ASTM D 1785.

2.1.1 Schedule Pipe (PVC)

Pipe shall be Schedule 80.

Material shall be PVC Class 12454-B in accordance with ASTM D 1784.

2.1.3 Fittings (PVC)

2.1.3.1 Socket-Type, Schedule 40

Material shall be PVC in accordance with ASTM D 2466.

2.1.3.2 Socket-Type, Schedule 80

Material shall be PVC in accordance with ASTM D 2467.

2.1.3.3 Threaded, Schedule 80

Material shall be PVC in accordance with ASTM D 2464.

2.1.4 Cement and Lubricant

Solvent cement for pipe and fittings shall be in accordance with ASTM D 2564. Thread lubricant shall be in accordance with the pipe manufacturer's recommendations.

2.2 CHLORINATED POLYVINYLCHLORIDE (CPVC) PIPE

CPVC pipe shall be in accordance with ASTM F 441.

2.2.1 Schedule Pipe (CPVC)

Pipe shall be Schedule 80.

Material shall be CPVC Class 23447-B in accordance with ASTM D 1784.

2.2.3 Fittings (CPVC)

2.2.3.2 Socket-Type, Schedule 80

Material shall be CPVC in accordance with ASTM F 439.

2.2.3.3 Threaded Schedule 80

Material shall be CPVC in accordance with ASTM F 437.

2.2.4 Cement and Lubricant

Solvent cement for pipe and fittings shall be in accordance with ASTM D 2564

Thread lubricant shall be in accordance with the pipe manufacturer's recommendations.

2.4 ACRYLONITRILE-BUTADIENE-STYRENE (ABS) PIPE

2.4.1 Schedule Pipe (ABS)

ABS schedule pipe shall be in accordance with ASTM D 1527.

Pipe shall be Schedule 80.

Pipe shall be ABS 1210.

2.4.3 Threaded Pipe

Threaded pipe shall be in accordance with ASTM D 1527.

Pipe shall be ABS 1210.

2.4.7.2 Schedule 80, Socket-Type

Schedule 80, socket-type fittings shall be in accordance with ASTM D 1527.

Fittings shall be Type I, Grade 1.

2.4.7.3 Schedule 80, Threaded

Schedule 80, threaded fittings shall be in accordance with ASTM D 1527.

Fittings shall be Type I, Grade 1.

2.4.8 Cement and Lubricant

Solvent cement for pipe and fittings shall be in accordance with ASTM D 2235
Thread lubricant shall be in accordance with the pipe manufacturer's instructions.

2.3.4 Pipe Thread Tape

Antiseize and sealant tape shall be polytetrafluoroethylene (PTFE)

2.3.5 Flanges

Flange material shall be the same as the pipe to which it is attached All

flange facings and drilling patterns shall conform to ANSI B16.5 flat face.

2.3.6 Flange Bolting

All flange bolting shall be ASTM A193, Grade B8, Class 1 studs with ASTM A194, Grade 8 heavy hex nuts and Type 304 stainless steel flat washers.

2.3.7 Flange Gaskets

Flange Gasket Material shall be ASTM F152 Neoprene, 1/8" thick. Cut gaskets to match flange facings as required or provide pre-cut gaskets. All flange gaskets shall be full face type.

2.4.9 Valves

Valves shall be of the size and type indicated on the drawings and in the Valve List. Materials and pressure rating shall match the connected piping. Unless otherwise indicated or required for equipment connection, valves shall be union both ends.

Ball valves shall be full port with tee hands.

PART 3 EXECUTION

3.1 PIPE LAYOUT

Installation shall present a neat, orderly appearance. Openings or passageways shall not be blocked.

Piping shall be located and routed as shown on the drawings.

3.2 INSTALLATION

Plastic piping shall be installed in accordance with the manufacturer's installation instructions.

3.2.1 Vertical Piping

Piping shall be supported at intervals of not more than four feet.

Piping shall be secured at sufficiently close intervals to keep pipe in alignment and to support weight of pipe and contents.

Piping shall be secured in position by approved stakes or braces when piping is to stand free, or when no structural element is available for providing stability during construction.

3.2.2 Horizontal Piping, Suspended

All piping shall be supported at intervals in accordance with the manufacturer's instructions and in no case more than five feet.

Hangers shall be installed at ends of runs or branches and at each change of direction or alignment.

3.2.4 Cutting

Cuts shall be made square with pipe and burrs shall be removed by smoothing edges.

3.2.5 Joints

Threaded joints shall be used only where indicated on drawings or required

for instruments and equipment. Joints shall be tightened in accordance with the manufacturer's instructions. Thread sealant tape shall be used on all threaded joints.

Junction with other materials shall be the type of adapter as shown on the drawings or as recommended by the pipe manufacturer.

Joints shall be solvent cemented in accordance with ASTM D 2855.

Flange bolting shall be tensioned by torque in accordance with flange manufacturer's instructions. Apply a stainless steel compatible antsieze compound to stud threads before installing nuts.

3.3 FIELD QUALITY CONTROL

3.3.1 Inspections

Prior to initial operation, inspect piping system for compliance with drawings, specifications and manufacturer's submittals.

3.3.2 Field Testing

Before final acceptance of the work, test each system in accordance with approved test procedure to demonstrate compliance with the contract requirements. Correct the defects in the work provided by the Contractor, and repeat tests until work is in compliance with contract requirements. Furnish water, electricity, instruments, connecting devices and personnel for performing tests. Perform testing in accordance with the Contractor prepared procedures approved by the Contracting Officer.

3.3.3 Process Piping

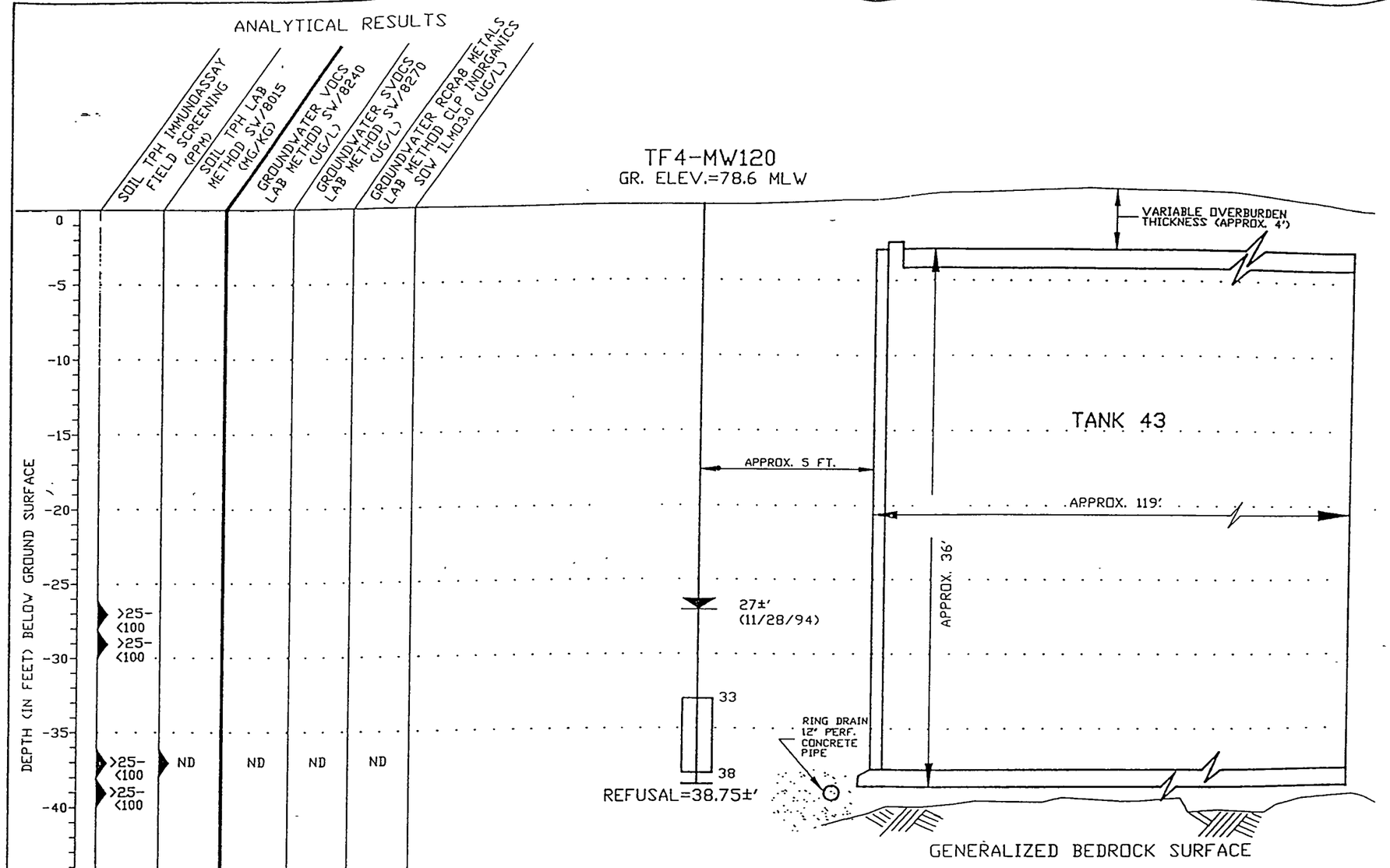
Hydrostatically test all process piping at not less than 75 psig with no leakage or reduction in gage pressure for 2 hours. Where piping cannot be isolated for pressure test, leak test at conditions equivalent to operating conditions.

-- End of Section --

APPENDIX B

TANK FARM 4 UST ELEVATION DATA

UST-43 (Influent Tank)
UST-44 (Effluent Tank)



LEGEND

⧗	WATER TABLE (FEET BELOW GROUND SURFACE)
1 / 2	MONITORING WELL SCREEN DEPTH (FEET BELOW GROUND SURFACE)
UG/L	MICROGRAMS PER LITER
PPM	PARTS PER MILLION
MG/KG	MILLIGRAMS PER KILOGRAM
MG/L	MILLIGRAMS PER LITER
TPH	TOTAL PETROLEUM HYDROCARBON
VOCS	VOLATILE ORGANIC COMPOUNDS
SVOCS	SEMI-VOLATILE ORGANIC COMPOUNDS
TF4	TANK FARM 4
MW101	GROUNDWATER MONITORING WELL NO.
MLW	MEAN LOW WATER
ND	NOT DETECTED

DATA SHEET – TANK 43

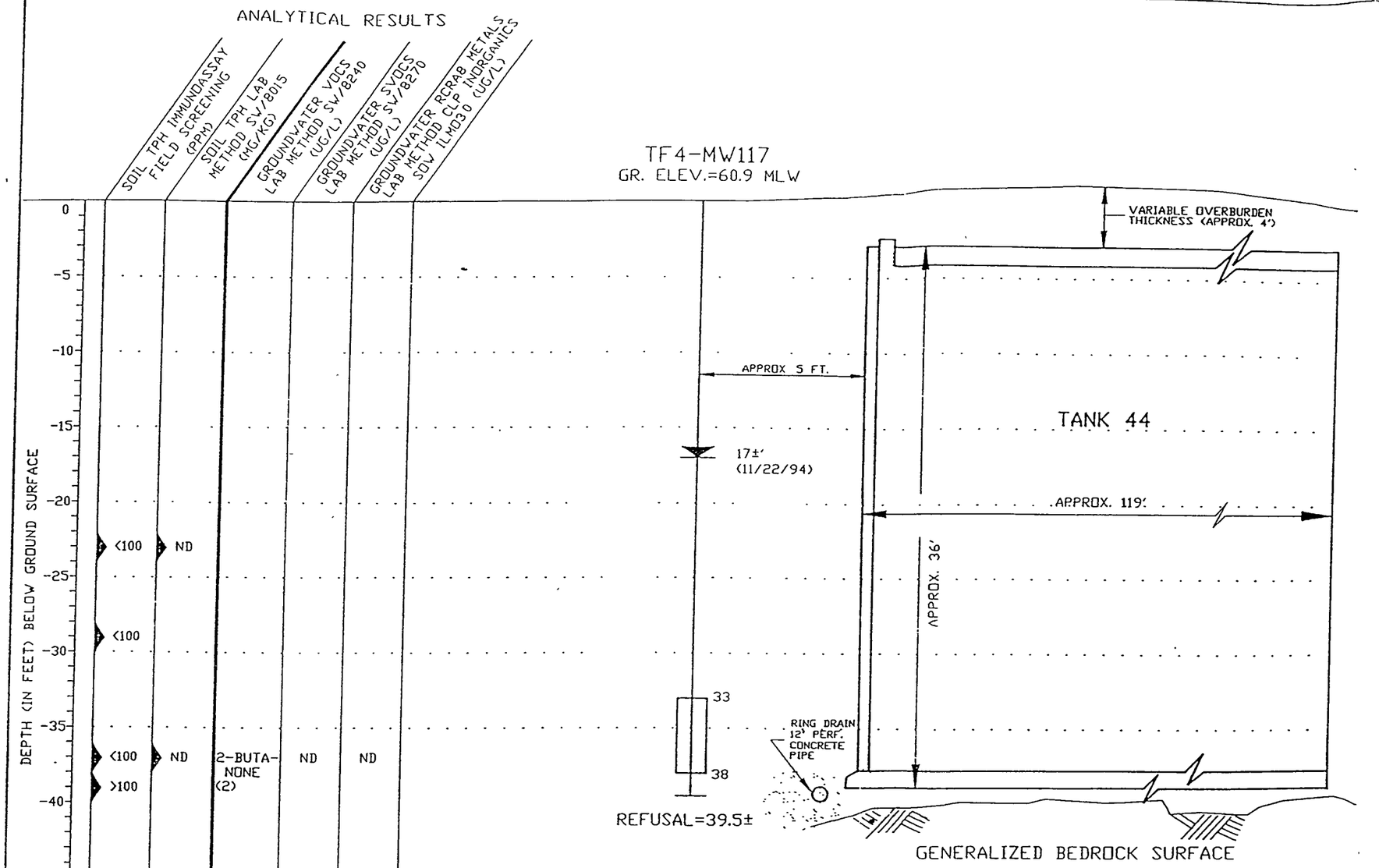
NETC–NEWPORT, RI

PRELIMINARY CLOSURE ASSESSMENT REPORT

DRAWN BY:	R.C. DEWSNAP	REV.:	1
CHECKED BY:	J.B. HOLDEN	DATE:	5 JUN 95
SCALE:	1" = 8' (APPROX.)	FILE NO.:	C:\DWG\NETC\FIG_3-7

FIGURE 3-7

Halliburton NUS CORPORATION
55 Jonspin Road Wilmington, MA 01887
(508)658-7899



LEGEND

⊼	WATER TABLE (FEET BELOW GROUND SURFACE)
1 / 2	MONITORING WELL SCREEN DEPTH (FEET BELOW GROUND SURFACE)
UG/L	MICROGRAMS PER LITER
PPM	PARTS PER MILLION
MG/KG	MILLIGRAMS PER KILOGRAM
MG/L	MILLIGRAMS PER LITER
TPH	TOTAL PETROLEUM HYDROCARBON
VOCS	VOLATILE ORGANIC COMPOUNDS
SVOCS	SEMI-VOLATILE ORGANIC COMPOUNDS
TF4	TANK FARM 4
MW101	GROUNDWATER MONITORING WELL NO.
MLW	MEAN LOW WATER
ND	NOT DETECTED

DATA SHEET – TANK 44	FIGURE 3-8
NETC–NEWPORT, RI	
PRELIMINARY CLOSURE ASSESSMENT REPORT	
DRAWN BY: R.G. DEWSNAP	REV.: 1
CHECKED BY: J.B. HOLDEN	DATE: 5 JUN 95
SCALE: 1" = 8' (APPROX.)	FILE NO.: C:\DWG\NETC\FIG_3-8

Halliburton NUS CORPORATION
55 Jonspin Road Wilmington, MA 01887
(508)658-7899

TABLE 15

NETC-T, ARM FIVE
SUMMARY OF MISCELLANEOUS PARAMETERS
IN WATER SAMPLES
FEBRUARY 1994

COMPOUND (ppm)	Tank 49	Tank 50	Tank 51	Tank 52	Tank 54	Tank 55	Tank 57	Tank 58	Tank 59
Hardness	156	585	325	954	294	228	178	127	143
Alkalinity	143	347	115	231	67	92	80	61	75
Total Suspended Solids	12	16	42	94	4.0	4.0	5.0	<1.0	<1.0
Total Dissolved Solids	227	2470	597	5560	263	408	221	183	204
Total Organic Carbon	16	12	22	128	165	11	15	356	267
COD	460	368	460	1330	276	184	37	46	28
BOD5	176	42	206	186	55	206	42	45	36
Ammonia (N)	<0.1	0.59	0.11	2.3	0.13	0.17	<0.1	0.3	0.15
Total Phosphorus	0.075	0.65	0.35	1.0	0.11	0.25	0.025	0.05	0.038
Oil and Grease	93	3.4	80	84	84	19	6	8.4	2.2
Surfactants	0.13	0.62	0.74	1.6	0.42	0.70	0.2	0.09	0.11
Phenols	0.15	0.36	0.75	0.52	0.1	0.4	0.05	<0.02	0.08
Fecal Coliform, MPN/100 ml	<2	<2	<2	<2	<2	8	2	7	<2
Nitrate-Nitrite (N)	0.05	<0.05	0.10	0.07	<0.05	<0.05	0.07	0.05	0.10
Sulfate	<1.0	47	11	1.0	1.0	3.0	2.0	8.0	5.0
Sulfide	0.05	4.0	0.1	50	0.135	0.02	<0.02	0.15	0.54
Total Cyanide	<.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01

TAB C-3

NETC – FARM FIVE
SUMMARY OF COMPOUNDS DETECTED
IN WATER SAMPLES
FEBRUARY 1994

COMPOUND (ppb)	Tank 49	Tank 50	Tank 51	Tank 52	Tank 54	Tank 55	Tank 57	Tank 58	Tank 59	Reporting Limit
VOLATILE ORGANICS										
Benzene	ND	29	2.03	41	ND	2.22	ND	ND	10	1
Chlorobenzene	ND	ND	ND	ND	ND	ND	ND	ND	3.49	1
1,1 – Dichloroethane	ND	2.48	5.15	20	ND	1.67	ND	ND	ND	1
cis – 1,2 – Dichloroethene	ND	1.53	11	2.51	ND	7.95	ND	ND	ND	1
trans – 1,2 – Dichloroethene	ND	ND	2.36	ND	ND	1.70	ND	ND	ND	1
Ethylbenzene	ND	22	1	30	ND	ND	ND	ND	1.93	1
Toluene	ND	40	3	26	1.06	7.28	ND	ND	1.84	1
Trichloroethene	ND	ND	ND	1.91	ND	ND	ND	ND	ND	1
Vinyl Chloride	ND	17	568	134	56	417	ND	ND	ND	20
Xylene, Total	ND	104	20	141	3.69	34	2.24	3.20	86	1
SEMIVOLATILE BASE/NEUTRAL EXTRACTABLES										
Acenaphthene	6.08	47	1.81	4.56	14	5.56	2.79	1.74	1.43	1
Anthracene	4.96	26	ND	1.35	7.73	2.93	ND	ND	ND	1
Benzo (a) anthracene	ND	1.04	ND	1.93	ND	ND	ND	ND	ND	1
Bis (2 – ethylhexyl) phthalate	ND	ND	ND	ND	7.04	5.68	3.15	7.88	ND	1
Chrysene	ND	1.99	ND	ND	ND	ND	ND	ND	ND	2
Dibenzofuran	6.93	32	1.99	3.76	ND	4.86	2.40	ND	ND	2
Di – n – Butylphthalate	ND	ND	ND	ND	ND	ND	1.05	ND	ND	1
Fluoranthene	ND	3.09	ND	ND	ND	ND	ND	ND	ND	1
Flourene	15	90	3.45	8.21	14	11	5.17	3.45	2.32	1
2 – Methylnaphthalene	16	98	59	84	4.50	74	7.50	7.77	59	1
Naphthalene	10	33	50	69	5.93	39	4.44	5.50	63	1
Phenanthrene	17	76	1.84	8.27	16	7.75	2.29	1.79	1.95	1
Pyrene	ND	8.63	ND	2.10	ND	1.30	ND	ND	ND	1
SEMIVOLATILE ACID EXTRACTABLES										
2,4 – Dimethylphenol	ND	55	28	8.18	6.98	8.64	2.89	2.49	8.57	1
2 – Methylphenol	ND	ND	87	7.67	1.64	42	ND	ND	ND	1
4 – Methylphenol	ND	ND	38	ND	1.07	18	ND	ND	ND	1
Phenol	ND	ND	83	ND	ND	35	ND	ND	ND	1

TABLE 3

TANK FARM 4
SUMMARY OF POSITIVE CONTAMINANT DETECTIONS IN GROUNDWATER SAMPLES
DECEMBER 1994

TANK	MONITORING WELL	CONTAMINANT(S)	CONCENTRATION(S)
Tank 37	MW124	Mercury	1.0 ppb
Tank 38	MW125	1,1,2,2-Tetrachloroethane	1.0 ppb
		Fluorene	20.0 ppb
		Phenanthrene	48.0 ppb
		Pyrene	28.0 ppb
		Chrysene	23.0 ppb
Tank 39	MW115	2-Butanone	2.0 ppb
Tank 40	MW114	No Positive Detects	-
Tank 41	MW116	2-Butanone	2.0 ppb
Tank 42	MW123	Arsenic	33.0 ppb
		Chromium	25.8 ppb
		Lead	16.0 ppb
Tank 43	MW120	No Positive Detects	-
Tank 44	MW117	2-Butanone	2.0 ppb
Tank 45	MW122	Fluorene	16.0 ppb
		Phenanthrene	15.0 ppb
		Pyrene	15.0 ppb
		Arsenic	656 ppb
		Barium	1530 ppb
		Chromium	496 ppb
		Lead	722 ppb
		Mercury	0.52 ppb
		Silver	29.0 ppb
Tank 46	MW121	Arsenic	12.6 ppb
		Barium	51.4 ppb
		Chromium	5.2 ppb
		Lead	11.8 ppb
Tank 47	MW118	2-Butanone	2.0 ppb
Tank 48	MW119	Naphthalene	1.0 ppb
		2-Methylnaphthalene	7.0 ppb
		Dibenzofuran	1.0 ppb
		Fluorene	2.0 ppb
		Phenanthrene	3.0 ppb
		Pyrene	2.0 ppb
		Mercury	0.42 ppb

APPENDIX C

TANK FARM 4 GAUGING REPORT

Halliburton NUS
CORPORATION

55 Jonspin Road
Wilmington, MA 01887

(508) 658-7899
FAX: (508) 658-7870

TO: D LEADENHAM

C-52-3-5-2185W

March 21, 1995

Project Number 0288

Mr. Brian Helland
Northern Division, Code 1811
Naval Facilities Engineering Command
10 Industrial Highway, Mail Stop #82
Lester, Pennsylvania 19113

Reference: Contract No. N62472-90-D-1298 (CLEAN)
Contract Task Order No. 143

Subject: Transmittal of Results of Tank Gauging At Tank Farm 4,
NETC-Newport, Rhode Island

Dear Mr. Helland.

Find enclosed four copies of the Results of Tank Gauging at Tank Farm 4, NETC- Newport, Rhode Island. Distribution has been made to the personnel listed below.

If you have any questions or comments concerning the report, please do not hesitate to contact me at (508) 658-7899.

Very truly yours,

Walter J. Martin
Project Manager

WJM:gmdb

Enclosure

cc: D. Dorocz (NETC) Code 40E w/enc.
J. Trepanowski/M. Turco (HNUS) w/enc.
File 0288-3.2 w/o enc.
File 0288-2.1 w/enc.

RESULTS OF TANK GAUGING
TANK FARM 4
CTO 143
NETC-NEWPORT

1.0 INTRODUCTION

Halliburton NUS Corporation conducted Tank Gauging activities from February 27 through March 3, 1995 at Tank Farm 4 located at NETC -Newport, Rhode Island. The work was authorized under the Record of Change Memorandum dated January 19, 1995. Level of effort and budget estimates were reported to the Navy in Cost Impact Letter No. 2 addendum dated February 20, 1995.

This letter report addresses gauging the thickness of oil, water and sludge layers in each of twelve underground storage tanks located at Tank Farm 4 (Tanks 37 - 48). The volume of each phase present in the tanks was also estimated. Several methods were used to accurately gauge the three phase layers: a weighted tape was used to measure the depth to the top of the oil layer; a customized colliwasa sampler, an M-scope, and a viscosity meter were used to measure the bottom of the oil layer; and a dipstick was used to measure the sludge layer and the overall tank depth. The depth of the water layer was arithmetically estimated from the previous measurements. The following discussion presents the gauging methods and health and safety procedures employed during conduct of this task.

2.0 GAUGING METHODOLOGY

The tank gauging was conducted at the manholes located inside of the tank manways. A reference point for gauging measurements was established at the edge of each manhole; and the distance from the reference point to the top of the tank ceiling was measured. Measurements were collected at one location at each tank. All measurements were recorded by the task manager, and the thickness of each layer was estimated prior to completing work at each tank. If a measurement discrepancy was apparent, the measurement was checked, and the thickness of each layer was recalculated.

2.1 MEASUREMENT TO TOP OF TANK CONTENTS

The distance to the surface of the top oil phase was measured using a weighted tape. The tape was lowered into the tank until it touched the surface of the top tank phase. The measurement was made with reference to the established reference point.

The level of confidence of this measurement is high because the measurement process could be visually monitored and controlled.

2.2 MEASUREMENT OF THE OIL/WATER INTERFACE

Several methods were used to determine the thickness of the upper oil layer. This layer is typically extremely viscous. In some cases, it was observed by the field crew, that where the oil layer was punctured by a probe point, a 2 inch diameter hole caused by the point remained open overnight. The high viscosity of this layer resulted in fouling and failure of some gauging equipment.

Water Level Indicator (M-scope)

The following procedure was routinely used to isolate monitoring equipment from the upper oil layer to prevent smearing of oil on the equipment while raising and lowering of the equipment through the oil layer.

One end of a large diameter (1.25 inch or 1.5 inch) PVC pipe was closed off with aluminum foil and lowered through the upper oil into the water phase. The PVC pipe served to isolate the M-scope from the upper oil so that the scope remained clean. The probe was lowered through the PVC into the water layer, at which time the PVC pipe was retracted from the tank. The probe was raised and the depth of the bottom surface of the top oil phase was recorded as indicated by the meter.

The viscosity meter was used to confirm measurements made with the M-scope method. Results of the field confirmation indicated the M-scope method was indicating a significantly thinner oil layer than was measured with the viscosity meter.

Apparently, the "borehole" created by the PVC pipe did not collapse after retraction of the pipe. The hole in the viscous oil remained open following retraction of the PVC pipe and filled with a minimal quantity of liquid phase petroleum, and water. The thickness of liquid phase oil filling the borehole was considerably thinner than the oil layer. As the M-scope was retracted through the "borehole," the true thickness of the upper oil was not registered.

The oil layer was gauged in four tanks prior to identification of the problem and the M-scope method was not used after that time. The oil layer in the four tanks was later regauged using the viscosity meter method.

Customized Coliwasa Sampler

An attempt was made to gauge the thickness of the oil layer with a coliwasa sampler. A customized coliwasa sampler was constructed using transparent acetate (1.75 inch inside diameter) pipe so that the oil thickness could be measured directly from the oil recovered in the sampler.

The pipe was lowered through the upper oil into the water phase and the bottom end was plugged with a remotely operated stopper. The coliwasa was then retracted from the tank and handled in a manner to keep the pipe in a vertical position. The outside of the apparatus was wiped clean using a petroleum absorbent pad to allow for a visual observation of the top oil phase thickness.

This method was not effective because of the high viscosity of the top oil phase. The oil did not readily flow into the 1.75 inch diameter acetate pipe and this method was not used.

Viscosity Meter

A small, 1.5 volt battery powered propeller unit was hard wired to a power source and an ampmeter to detect the lower oil layer surface. The propeller unit draws a significantly higher amperage while operating in the viscous oil than in the underlying water layer. By advancing the unit through the oil and into the water, the change in amperage can be noted on the ammeter. The decrease in amperage indicates the oil/water interface.

The potentiometer was secured to the bottom end of the small diameter PVC pipe. Electrical wire was threaded through PVC pipe, connecting the propeller to a 1.5 volt battery and a multimeter. The propeller was powered and then slowly pushed through the top phase of oil. Once the potentiometer

passed through the oil into the water phase, the amperage significantly dropped and the length of pipe was measured to the reference point.

The distance from the top of the tank to the top of the tank contents was then subtracted from the length of pipe required to reach the oil/water interface. The resulting calculation represents the estimated thickness of the top oil phase.

This method was successful and was repeated two to three times at each tank in order to evaluate the reproducibility of the method. Results of this QC indicated that measurements could be repeated to an accuracy of 0.25 of a foot. This accuracy would result in a volume estimate accurate to within an estimated 20,000 gallons, assuming a uniform thickness of oil across the tank.

2.3 MEASUREMENT OF THE BOTTOM SLUDGE

One end of a large diameter (1.25 or 1.5 inch) PVC pipe was sealed with aluminum foil and lowered through the upper oil into the water phase. A smaller diameter (0.5 inch) PVC pipe was lowered through larger PVC, pushed through the aluminum foil, into the water phase to the bottom of the tank. The larger PVC pipe served to isolate the smaller pipe from the upper oil so that oil did not smear the small diameter pipe. The overall depth of the tank (to the reference point) was marked on the small PVC pipe, which was then retrieved through the large diameter PVC. Bottom sludge adhered to the PVC pipe. The thickness of the bottom sludge and overall tank depth were measured directly from the small diameter PVC.

The level of confidence of this measurement is high, because the volume is estimated based on a taped measurement of oil adhering to the PVC pipe. The variable which may introduce error into this measurement is a variable thickness of sludge may be present across the tank bottom resulting from the pitched tank floor. It was not the purpose of this task to evaluate this condition, and no effort was made to determine the potential error caused by a pitched tank floor.

2.4 ESTIMATION OF THE THICKNESS OF THE WATER PHASE.

The estimated thickness of the water layer was determined by subtracting the thickness of the upper oil and bottom sludge layers from the total thickness of the tank contents.

The level of confidence of this estimation is a function of the accuracy of the estimation of the volume of oil because the estimation of the volume of water is made by subtracting the total estimated oil and sludge volume from the volume of the total tank contents.

3.0 HEALTH AND SAFETY

HNUS classified the tank manways as Permit-Required Confined Spaces and, therefore, all entry work was conducted in compliance with the OSHA regulation 29 CFR 1910.146. The majority of the work was conducted in Level D respiratory protection, however, there were several upgrades to Level C (air-purifying full-face cartridge respirator). In summary, entry into each tank required:

- completion of a confined space entry permit
- an Attendant on duty
- initial and periodic air monitoring using an O_2/LEL meter, PID, H_2S Minicheck, and Drager tubes (benzene)
- entrants use of a body harness and lifeline
- assorted PPE (PE-coated coveralls, rubber boots or waders, latex gloves, and hardhat)

4.0 CONCLUSIONS

The results of the gauging measurements and volume estimates are presented in Table 1. All twelve tanks have a minimum of two phase layers, oil and water. The sludge layer was not detected in two tanks, 41 and 45.

FIGURE 1
CTO 143 – TANK FARM 04 TANK PHASE
VOLUME ESTIMATE
HALLIBURTON NUS CORPORATION

	TANK			HEADSPAOE	OIL		WATER		SLUDGE		TOTAL LIQUIDS		
	DIAMETER	DEPTH (ft)	VOL. (gal)	DEPTH (ft)	DEPTH (ft)	VOL. (gal)	DEPTH (ft)	VOL. (gal)	DEPTH (ft)	VOL. (gal)	DEPTH (ft)	VOL. (gal)	DATE
TANK 37	116	33.54	2635607.88	18.62	0.51	40076	14.26	1120566	0.15	11787	14.92	1172429	03/02/95
TANK 38	116	33.6	2640322.74	6.21	0.61	47934	26.66	2094970	0.12	9430	27.39	2152335	03/02/95
TANK 39	116	33.93	2666254.48	5.48	0.96	75438	25.54	2006960	1.95	153233	28.45	2235630	02/28/95
TANK 40	116	33.55	2636393.69	0.63	2.75	216098	30.15	2369218	0.02	1572	32.92	2586888	03/01/95
TANK 41	116	33.57	2637965.31	21.25	1.3	102155	11.02	865963	0	0	12.32	968118	03/02/95
TANK 42	116	33.57	2637965.31	26.62	0.65	51078	6.28	493489	0.02	1572	6.95	546138	03/03/95
TANK 43 (1)	116	33.56	2637179.5	14.8	1.62	127301	16.89	1327234	0.25	19645	18.76	1474180	02/28/95
TANK 44 (2)	116	33.62	2641894.36	14.42	1.73	135945	17.37	1364953	0.1	7858	19.2	1508756	03/02/95
TANK 45	116	32.59	2560955.9	22.65	0.6	47149	9.34	733947	0	0	9.94	781095	03/01/95
TANK 46	116	33.58	2638751.12	23.87	0.71	55793	8.99	706443	0.01	786	9.71	763022	03/03/95
TANK 47	116	33.46	2629321.4	22.505	0.47	36933	10.36	814100	0.125	9823	10.955	860855	02/27/95
TANK 48	116	33.57	2637965.31	13.07	0.95	74652	19.5	1532330	0.05	3929	20.5	1610911	02/28/95

NOTES:

(1) TANK 43 - INFLUENT TANK TO BE USED AS-IS.

(2) TANK 44 - EFFLUENT TANK TO BE CLEANED PRIOR TO UTILIZATION

Note: The oil values for Tanks 43, 47, and 48 were sampled on 03/03/95

US NAVY NORTHERN DIVISION
REMEDIAL ACTION CONTRACT (RAC)
CONTRACT NO. N62472-94-D-0398
DELIVERY ORDER NO. 0013

ATTACHMENT A
STATEMENT OF WORK
FOR
WASTE TRANSPORTATION AND DISPOSAL SERVICES
SOW-1284-13-12

TANK FARM NO. 4 REMEDIAL ACTIONS
NAVAL EDUCATION AND TRAINING CENTER (NETC)
NEWPORT, RHODE ISLAND

April 1996

Prepared By:

Foster Wheeler Environmental Corporation
470 Atlantic Avenue
Boston, Massachusetts 02210

Revision	Date	Prepared By	Approved By	Pages Affected
0	4/25/96	G. Karwoski/K. Shah GK K:Shah	B. Allen/M. Zizza	All

TABLE OF CONTENTS

TABLES

FIGURES

ATTACHMENTS

1.0 INTRODUCTION

1.1 Purpose

This Statement of Work (SOW) provides the Subcontractor with a description of the equipment and services required to transport and dispose of/or recycle waste streams generated as a result of remedial activities conducted by Foster Wheeler Environmental Corporation (Foster Wheeler Environmental) at the US Navy Northern Division (Navy) Naval Education and Training Center (NETC) Tank Farm No. 4, located in Portsmouth, Rhode Island (the Site). All work for this SOW will be performed under the technical direction of Foster Wheeler Environmental.

1.2 Site Location

The Site is located approximately 25 miles southeast of Providence, Rhode Island in the town of Portsmouth, Rhode Island (Newport County) as shown in Figure 1-1. The Defense Highway is to the north/northwest of the site, Narragansett Bay is located 500 to 1,000 feet to the west and Norman's Brook is located in the southwest corner of the Site. A residential area is located to the southeast of the Site and undeveloped woodlands are located north/northeast of Tank Farm No. 4. Located to the south and to the North are NETC Tank Farm No. 5 and Tank Farm No. 3, respectively. Refer to Figure 1-2 for existing conditions and site logistic layout.

1.3 Project Description

The NETC Tank Farm No. 4 consists of approximately 90 acres of open land containing 12 large reinforced concrete underground storage tanks (USTs) owned and controlled by the Navy. Tank Farm No. 4 is located approximately 20 to 111 feet above sea level. The tank farm was constructed by the Navy in 1941 and was used to store liquid petroleum products. However, the USTs have not been in use since the 1970's.

In 1992, the State of Rhode Island enacted UST regulations and therefore the USTs at NETC Tank Farm No. 4 became subject to these closure requirements. Closure activities will include removal of all contents from the USTs, and cleaning and repairing the USTs. The contaminants of concern at Tank Farm No. 4 are those associate with petroleum based products and asbestos pipe insulation.

2.0 SCOPE OF WORK

Foster Wheeler Environmental requires the transportation and off-site disposal/or recycling of several wastestreams generated from remedial activities at Tank Farm No. 4. These waste streams are identified in Table 2-1.

2.1 Wastestreams for Off-Site Disposal

The wastestreams planned for off-site disposal or recycling are described below. Anticipated sampling/analyses (to be performed by Foster Wheeler Environmental) and estimated quantities are given in Table 2-1. If additional analyses are required for disposal facility acceptance, the Subcontractor shall perform these analyses at no additional cost. It should be noted that the quantities in Table 2-1 are approximate and may vary depending on field conditions. The waste quantities were estimated based on information provided by the US Navy and field experience at Tank Farm No. 5.

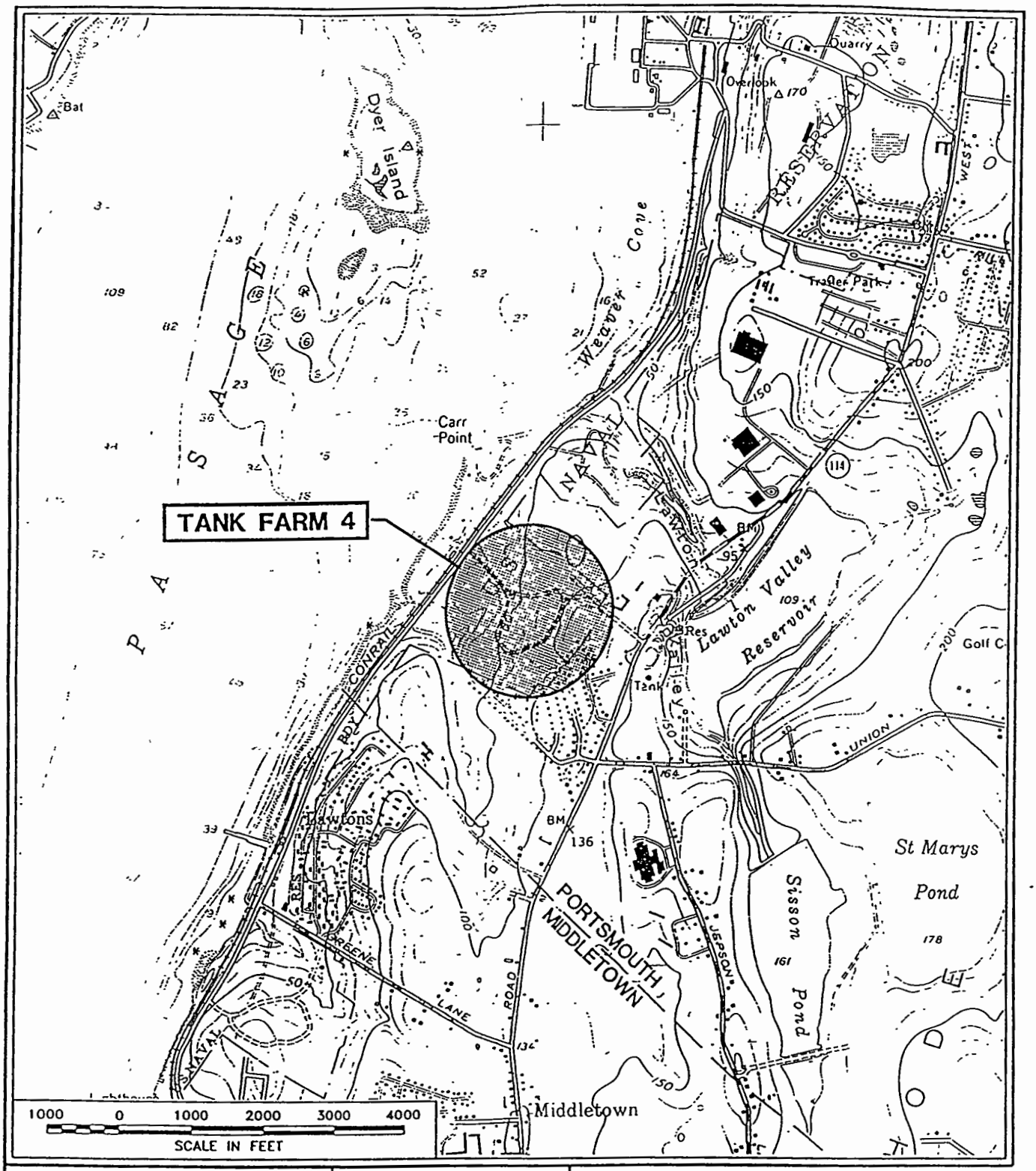


FIGURE 1-1

Naval Education and Training Center
Newport, Rhode Island

SITE LOCATION MAP

SCALE: AS SHOWN	PROJ. NO. 1284.0013.0103

CADFILE:1284FG11.DWG

SYM	ZONE	DESCRIPTION	DATE	APPROVED

N

UNDERGROUND STORAGE TANKS (TYPICAL)

SEE DETAIL 1 THIS SHEET FOR TYPICAL EQUIPMENT LAYOUT AT EACH TANK

NORMANS BROOK

CONTAMINATED SOIL STORAGE (50' x 80')

CHAMBER (TYPICAL)

EQUIPMENT DECONTAMINATION AREA (25'x30')

DRUM STORAGE (20' x 20')

ROLL-OFF

FRAC TANKS

TOILET FACILITIES

PERSONNEL SHOWER TRAILER NO. 3 (12' x 60')

WATER TREATMENT FACILITY (60' x 100')

500KVA PAD MOUNTED TRANSFORMER

SHUNT/LOOP PIPING

BURIED PIPE

TO BURNING PIT

TO CHAMBER A10

LUNCH/OFFICE TRAILER NO. 2 (12' x 60')

TOILET FACILITIES

75MVA POLE MOUNTED TRANSFORMER

DRY STORAGE ROOM (EXISTING TRANSFORMER VAULT)

ADMINISTRATION PARKING (60' x 100')

EXTENT OF SUPPORT AREA STABILIZATION

ADMINISTRATION TRAILER NO. 1 (12' x 60')

TRUCK PULLOVER AREA (12' x 100')

EXISTING OIL/WATER SEPARATOR TO BE DEMOLISHED BY PWDMC.

TEMPORARY HIGH VISIBILITY FENCE

VISITORS/WORKERS PARKING AREA (60' x100')

SUBCONTRACTOR TRAILER/LAYDOWN AREA

TIE-IN FOR SEWER LINE

TIE-IN FOR WATER LINE HYDRANT

TRUCK PULLOVER AREA (12' x 100')

SITE ENTRANCE GATE LOCATION

RUINS

REC. WAVE STORAGE

DEFENSE HIGHWAY

48 47 46 45 44 43 42 41 40 39 38 37 44 27 22

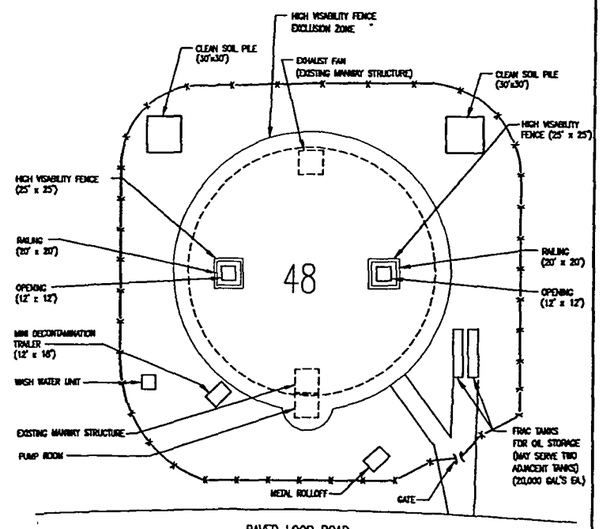
100 75' 50 110

LEGEND

- BUILDING OR STRUCTURE
- ROAD OR PAVED AREA
- TRAIL OR DIRT ROAD
- PROPERTY BOUNDRY & FENCE LINE
- FENCE
- NAVY PROPERTY BOUNDRY LINE
- REMEDIATION BOUNDRY
- RAILROAD
- STREAM
- SHORE LINE
- ROCK CONTOUR
- BOTHYMETRIC CONTOUR
- DEPRESSION CONTOUR
- 14. SPOT GRADE ELEVATION OR SPOT
- WOODED AREA
- MARSH LAND

NOTES

1. LOCATION OF EQUIPMENT MAY BE FIELD ADJUSTED AS NECESSARY.
2. GRAVEL ACCESS ROAD WILL BE LOCATED IN THE FIELD.



DETAIL 1

TYPICAL EQUIPMENT LAYOUT
AT EACH TANK LOCATION
SCALE 1" = 50'

PREPARED BY:

FOSTER WHEELER ENVIRONMENTAL CORPORATION
470 ATLANTIC AVENUE, BOSTON, MASSACHUSETTS 02210

BASE MAP DERIVED FROM:

MELVILLE SOUTH, EXISTING CONDITIONS MAP, NETC DWG. 31062-307 DATED 4/95, FROM THE DEPARTMENT OF THE NAVY, NAVAL FACILITIES ENGINEERING COMMAND, EDUCATION AND TRAINING CENTER, NEWPORT, RHODE ISLAND.

GRAPHIC SCALE IN FEET

50 0 100 200 300 400

CONTOUR INTERVAL 5 FEET

FOSTER WHEELER ENVIRONMENTAL CORPORATION
BOSTON, MASSACHUSETTS 02210

DEPT	DESIGNED	PREPARED	CHECKED	APPROVED	DATE
	FPZ	FPZ			4/16/96

SCALE	DRAWING NUMBER	CAD FILE NUMBER	SH. OF	REV
1"=100'	1264.0013.C4	C4.DWG		

NETC DWG. NO.	XXXXXX
OSOH. XXXXX	
DR. XXXX	
BR.	
DIR.	
APPROVED DATE	
SATISFACTORY TO	
DATE	

DEPARTMENT OF THE NAVY NAVAL FACILITIES ENGINEERING COMMAND
NAVAL EDUCATION AND TRAINING CENTER
NEWPORT, RHODE ISLAND

TANK FARM 4 CLOSURE

NAVY REMEDIAL ACTION CONTRACT
DELIVERY ORDER NO.13

SITE LAYOUT PLAN

SIZE	CODE IDENT NO.	GRAPHIC DRAWING NO.
F	80091	

SCALE XXXX CONSTR. CONTR. NO. XXXXX

Table 2-1
Estimated Quantities and Analyses of Wastes for Off-Site Disposal/Recycling

Wastestream	Estimated Quantity	Planned Analyses (Performed by Foster Wheeler Environmental)
1. Product oil	1,010,565 gallons	Ignitability, reactivity, TCLP, and PCB
2. Sludge (non-hazardous)	230,730 gallons	Ignitability, reactivity, TCLP, and PCB
3. Sludge hazardous	54,910 gallons	Ignitability, reactivity, TCLP, and PCB
4. Drummed oil contaminated debris and sludge	100 (55 gal) drums	Ignitability, reactivity, TCLP, and PCB
5. Oil contaminate PPE/debris	220 cu. yds.(11 roll-offs)	No analysis planned. Will classify/ characterize based upon classification/ characterization of oil sludge which is in contact with PPE. Hazardous PPE to be separated from non-hazardous PPE.
6. Oil contaminated soil	1,000 tons	TCLP, PCB, reactivity, ignitability, and TPH
7. Bag filters - WWTP	2 drums (55 gal)	TCLP and PCB
8. Clean construction debris	120 cu. yds. (6 roll-offs)	Field screening (PID/FID)
9. Decontamination water	5,000 gallons	TCLP, pH, and PAH
10. Miscellaneous lab pack chemicals	1 drum (55 gal)	None, Will identify items packed based on the product labels and MSDS (s)

2.1.1 Product Oil

The liquid surface layer in the USTs is a weathered free floating product (either fuel oil No. 6 and No. 2). This layer will be pumped into two temporary above ground storage tanks, 20,000 gallon capacity each, located adjacent to the UST. The product oil may also contain small quantities of water. Diesel fuel may be added as necessary to sludge within the UST to help reduce viscosity. The subcontractor shall provide pumps or vacuum truck services to transfer product oil/pumpable sludge either from the above-ground frac tanks or directly from the USTs for off-site disposal or recycling. The BTU value of the product oil and sludge may vary depending on the type of oil, quantity of water and other impurities present. The BTU value of the product oil is not known at this time. The Offerors are encouraged to submit alternate proposal for recycling Vs disposal of product oil to enhance cost effectiveness.

2.1.2 Sludge Non-Hazardous

(See Section 2.1.3 Sludge Hazardous)

2.1.3 Sludge Hazardous

Diesel will be added as necessary to the sludge within the UST to help reduce the viscosity. The sludge will be pumped into the above-ground temporary frac tanks. The sludge will be analyzed to determine if it is RCRA hazardous waste. The subcontractor shall provide pump or vacuum truck services to transfer sludge from the above ground frac tank to other bulk transport container for off-site disposal or recycling. Hazardous oil sludge will be taken to appropriate RCRA facility. Non-Hazardous oil sludge will be taken to non-RCRA disposal/recycling facility.

2.1.4 Drummed Oil/Contaminated Debris And Sludge

This waste stream will include non-pumpable material at the bottom of the UST. This may include wood, concrete, metal and other solids that may have been dropped in the tank. This material will be placed in DOT specified 55 gallon drums for off-site disposal. Foster Wheeler will analyze wastes to determine if the waste is RCRA hazardous.

2.1.5 Oil Contaminated PPE/Debris

This wastestream will include PPE used by workers on-site such as tyvek suites, respirator cartridges, dust masks, gloves, disposable boot covers and other miscellaneous oil contaminated debris.

2.1.6 Oil Contaminated Soils

The soil excavated during tank access, pump room access, loop/shunt piping removal and other excavation activities will be stockpiled in a bermed and lined area. The soil will be analyzed for TPH by Method 8015 modified. Soils with a TPH level less than 100 ppm will be used as backfill. Soils with a TPH concentration greater than 100 ppm will be further analyzed for full TCLP, PCBs, ignitability, and reactivity. The contractor shall provide dump trucks to remove the contaminated soil for off-site disposal.

2.1.7 Bag Filters - WTF

The wastewater effluent from the oil water separator will be pumped through dual stage bag filters to remove suspended solids (20 microns or larger). The bags will be replaced as necessary. The bags are made from polyethylene fabric. Foster Wheeler Environmental will test the bags for RCRA classification.

2.1.8 Clean Construction Debris

This material will be generated from various construction activities on-site. This material is not expected to be contaminated.

2.1.9 Decontamination Water

Some on-site equipment and vehicles will require decontamination. It is estimated that 5,000 gallons of decon water will be generated at the tail end of the demobilization.

2.1.10 Miscellaneous Lab Pack Chemicals

At the tail end of the job, various containers of unused commercial chemical products (spray paint cans, cleaners, lubrication oil cans, etc. will have to be disposed of.

2.2 Services Provided by the Subcontractor

2.2.1 Disposal Services

The Subcontractor shall be responsible for arranging disposal at an appropriately-permitted RCRA facility. However, if sampling indicates the material is non-RCRA and then disposal will be at an appropriate solid waste facility. Services shall include any waste analyses or characterization required for disposal facility acceptance, beyond that provided by Foster Wheeler Environmental.

The Subcontractor is responsible for the appropriate disposal of the wastestreams according to all applicable federal, state and local regulations and requirements. The scope of work includes any analytical testing required for final acceptance and disposal/recycling of wastes. All disposal/recycling facilities (hazardous and solid waste) must be approved by Foster Wheeler Environmental and the generator (U.S. Navy - NETC) prior to waste transport. The scope of work for disposal/recycling will include the following activities:

- Provide all necessary additional characterization testing required for materials to be accepted at the disposal/recycling facility. Provide labor and materials to perform any waste sampling and analysis effort required to conduct this testing. (These sampling/analytical costs are to be included in the fixed unit transportation/disposal costs.)

- Provide all necessary labor, supervision, insurance, equipment and material to properly package, label, mark and placard the materials for transport, including preparation of waste profiles, manifests and RCRA Land Disposal Restrictions Notification forms (if required), including any required documentation under the Universal Treatment Standards regulations, to Foster Wheeler Environmental's Technical Representative (identified in the Subcontract) for review and approval at least ten (10) calendar days prior to shipment.) For all documents, the generator is the U.S. Navy - NETC. All documentation will be signed by the U.S. Navy - NETC.

- Provide Foster Wheeler Environmental's Site Manager with a legible copy of the manifest signed by the disposal/recycling facility representative within 30 days of the arrival of the hazardous materials at the disposal facility. Specific site address to be provided elsewhere.

- Provide Foster Wheeler Environmental's Site Manager with a legible copy of Certificates of Disposal/recycling for any RCRA hazardous wastes. These disposal/recycling documents must be provided within 30 days after disposal/recycling of wastes.

- The Subcontractor must utilize the disposal/recycling facilities that have been approved in advance by Foster Wheeler Environmental (and the generator — U.S. Navy - NETC.) These facilities must be one of the approved facilities identified by Foster Wheeler Environmental (based on the facilities proposed by successful offer) in the Attachment to Section H of the Subcontract. Substitutions or additions shall not be permitted without prior written approval from Foster Wheeler Environmental, and if approved, shall be at no extra cost to Foster Wheeler Environmental. In the event that the identified and approved facility(ies) ceases to accept the stated materials or the facility(ies) ceases operations, it is the Subcontractor's responsibility to locate an alternate acceptable permitted facility(ies) and to notify Foster Wheeler Environmental within at least 14 days of proposed off-site transport. With the notifications, the Subcontractor must provide the same information as was required for the original facilities. The alternate facility(ies) must be approved in writing by Foster Wheeler Environmental in the same manner as for the original facility.

2.2.2 Transportation Services

The Subcontractor shall provide appropriate DOT permitted vacuum trucks, flatbed trucks, roll-off containers, dump trucks and transport vehicles with drivers, and shall provide sufficient transportation capacity to transport the wastes off-site as needed within one (1) week's notice after disposal facility approval has been obtained and thereafter within twenty four (24) hours after notification. Subsequent shipments off-site are anticipated to require a minimum of:

- Ten bulk loads of waste oil per day;
- Three bulk loads of sludge per day; and
- One 20 cu. yd. dump truck for contaminated soil removed per week

All other wastestreams anticipated for off-site disposal/recycling will be removed on an as-needed basis (anticipated to be once a month, if sufficient volume has been accumulated, or as one-time shipments).

Depending on waste types transported in bulk, the Subcontractor shall provide all necessary and appropriate liners and covers for roll-offs/dump trucks.

For waste oil and sludge shipments from FRAC, tank the subcontractor shall provide suitable DOT tank truck with pump or DOT approved vacuum truck and the driver and equipment to load liquid/sludge into the vehicle. The subcontractor shall provide appropriate placards and markings for the vehicles.

For drum shipments, the Subcontractor shall provide suitable transport vehicle and the labor and equipment to load the drums into the vehicle. The Subcontractor shall label and mark all drums with appropriate labels and markings.

The Subcontractor shall provide sufficient transport containers/vehicles (i.e., roll-offs or dump trucks) for "live loading", plus sufficient roll-off containers required for short-term (1-3 week) accumulation and time required to obtain disposal authorization. Foster Wheeler Environmental will provide equipment and labor to load roll-offs/dump trucks. This activity will be coordinated by Foster Wheeler Environmental's Site Manager. Driver may spot a trailer or roll-off for loading, and pick up a previously loaded container for transport.

The subcontractor shall also supply an estimated quantity of one (1) to three (3) roll-off containers that will remain on-site to allow Foster Wheeler Environmental to load materials during remediation activities.

Access to the site will be at the entrance road on defense highway located near the north/northwest of the property. The driver must sign in at The Administration Trailer. The driver will be directed by Foster Wheeler Environmental to the location on-site for loading of materials. If the truck will transport hazardous materials, Foster Wheeler Environmental retains the right to inspect for safety requirements and DOT Emergency Response information, which will remain the responsibility of the Subcontractor. The Subcontractor will retain ultimate responsibility for ensuring the vehicle can be released from the site onto public roadway.

For all materials, the Subcontractor shall obtain loaded weights by using the truck scales at the waste receiving facility. The Subcontractor shall comply with all Rhode Island DOT and Town of Portsmouth vehicle weight limits.

The Subcontractor is responsible for meeting all applicable federal, state and local regulations and requirements governing the transport of hazardous materials including 49 CFR 100-179. This includes, but is not limited to, labeling, manifesting, placarding, licensing, weight and route restrictions, and proper covering of any bulk loads. All transportation shall be by licensed, insured and permitted carriers. The Subcontractor must comply with all Federal Motor Carriers Safety Regulations (FMCSR) and must have current permits and licenses, as required by federal, state and local authorities. The transporter must have a current MC Safety Rating of "Satisfactory."

The Subcontractor shall maintain an Emergency Response telephone number (manned 24 hours), or shall subscribe to a reputable outside service (e.g., Chemtrec or Infotrac) which provides emergency response information and meets all DOT requirements for the Emergency Contact. The Subcontractor shall allow use of this phone number or service to complete Section 15 of the manifest and to serve as the DOT Emergency Contact, on behalf of the generator. (Foster Wheeler Environmental will verify this telephone number is appropriate prior to shipment of wastes off-site.)

The Subcontractor must utilize drivers who are DOT-trained for transportation of hazardous materials.

The Subcontractor is responsible for providing appropriate liners and tarps for bulk loads and for inspecting the tarps prior to transport off-site. The Subcontractor shall provide replacement liners and tarps, as needed.

The Subcontractor shall provide to Foster Wheeler Environmental and comply with an Emergency Response Plan. This Plan will be used as a guide to supplement federal, state, and local regulations during the performance of work under this subcontract. In the event of an accident, breakdown, or other emergency, drivers must adhere to the Subcontractor's established company procedures and reporting criteria contained in the Emergency Response Plan. The Subcontractor must provide each vehicle with appropriate spill response equipment (e.g., shovels, overpack drums, absorbents) and must respond immediately to properly contain any spilled wastes. All drivers must have the current DOT Emergency Response Guidebook in the truck cab at all times.

Transport vehicles may be inspected by Foster Wheeler Environmental for compliance, including:

- Safety requirements (back-up alarm, fire extinguisher, first aid kit, etc.);
- Placarding;
- Emergency Response information (Emergency Response Plan, DOT Guidebook); and
- Current State of Rhode Island and Federal DOT inspection documentation.

Also, disposal/recycling facility weigh scale calibration certification shall be furnished by State or independent provider.

2.3 Work Schedule

The Subcontractor shall be prepared to provide off-site transportation for materials starting approximately June of 1996. Soil/Sludge material is currently anticipated to be the first material for off-site removal. Materials will continue to be generated for off-site removal through approximately the end of June 1997.

2.4 Work Provided by Foster Wheeler Environmental

Foster Wheeler Environmental will monitor Health and Safety during loading of materials at the site. Foster Wheeler Environmental will be responsible for loading of the bulk materials shipped off-site into dump trucks and/or roll-off containers. Foster Wheeler Environmental will be responsible for reviewing and approving all manifests and shipping papers (including Land Disposal Restrictions Notifications and forms). Foster Wheeler Environmental will obtain the generator's signatures (i.e., U.S. Navy - NETCs representative) for material profiles and shipping papers for hazardous materials, as well as for non-regulated materials.

After loading (or roll-off pick up), Foster Wheeler Environmental personnel will require the subcontractor to cover the bulk load with the tarp.

3.0 HEALTH AND SAFETY

- All Subcontractor personnel working on-site shall comply with the Site Health and Safety Plan (SSHP).

- Prior to the start of work, all Subcontractor personnel shall attend a one-time Site Health and Safety Orientation and sign the SSHP to indicate they will comply with the SSHP.

- The Subcontractor shall retain full responsibility for the means, methods, and procedures utilized for safe conduct of his work. The Subcontractor shall be in compliance with the Site Health and Safety Plan.

- Foster Wheeler Environmental will provide oversight of all on-site Health and Safety activities. Foster Wheeler Environmental's Site Health and Safety Officer (SHSO) will have authority to stop work on the subcontract if he/she judges that the operations violate applicable OSHA and/or DOT requirements.

- The vehicle drivers shall have the required DOT training under 49 CFR 172 Subpart H applicable to transporting hazardous materials.

- A copy of the driver's current DOT training and DOT license, along with the DOT Physician's Statement, shall be provided to Foster Wheeler Environmental.

4.0 QUALITY CONTROL

The Subcontractor shall perform high quality work in accordance with this SOW and all permits or applications required. All field activities shall be conducted in an efficient and professional manner with minimal damage to the environment. All deficiencies in materials, activities, or workmanship shall be corrected by the Subcontractor at no additional cost to Foster Wheeler Environmental or the Navy.

A Quality Control Plan (QCP) has been prepared by Foster Wheeler Environmental for this project. The Subcontractor will be required to attend a quality control coordination meeting. The Subcontractor will also be required to make available all aspects of the work for inspection by Foster Wheeler Environmental quality control staff for conformance with the quality control aspects of the plan. Any unauthorized deviations from the specifications will be reported to the Subcontractor in writing, for correction at the Subcontractor's expense.

5.0 SUBMITTALS

The following submittals are required under this subcontract:

- Emergency Response Plan (with Proposal);

- DOT Training, DOT License & DOT Physician's Statement Documentation (with Proposal);

- Waste Profiles (with Proposal);

- Drafts & Finals
  - Manifests (Drafts upon award of Contract)
  - Bills of Lading (Non-regulated materials shipping papers) (Drafts upon award of Contract)
  - Land Disposal Restrictions Notification Forms (Drafts upon award of Contract)
  - Drum Labels & Markings (Drafts upon award of Contract);

- Vehicle Placards;

- Manifests Signed by SDF (within 30 days of receipt of waste);

- Bills of Lading Signed by Receiving Facilities (within 30 days of receipt of waste);

- Certificates of Disposal/recycling (within 30 days of receipt of waste);

- Weight Tickets from Receiving Facility (within 30 days of receipt of waste);

- Certification of Calibration of weigh scales at disposal/recycling facilities furnished by State or independent provider (upon award of subcontract); and

- Copies of permits and licenses from transportation, disposal and recycling facilities.

6.0 MEASUREMENT AND PAYMENT

Measurement and payment will be according to the fixed unit prices provided on the Proposal Price Form. Payment will be made after review and approval of an appropriate invoice per Section H-4 of the Subcontract, as indicated below.

For bulk shipments priced per ton, verification will be based on the actual weight of the bulk material received at the disposal/recycling facility. The Subcontractor must submit a certified weight ticket from the disposal/recycling facility with the invoice to document the actual weight received.

For bulk shipments priced per cubic yard, or gallon verification will be based on the actual volume received at the facility. The Subcontractor must submit documentation of the volume received at the disposal/recycling facility with the invoice.

For drum shipments, the number of drums shipped off-site (as indicated on the manifest) will be used as verification for payment purposes.

Foster Wheeler Environmental reserves the right to retain 10% of the invoiced disposal costs, until appropriate manifest copies (signed by the disposal facilities) have been received by Foster Wheeler Environmental (per Section H.4.1 — "Final Acceptance" of the Subcontract). Legible manifest copies sent to Foster Wheeler Environmental by facsimile are acceptable for this purpose.

Payment for minimum loads for either bulk solids, bulk liquids or drums shall only be as incorporated into Attachment B Price Form.

Offeror shall complete the Price Form (Attachment B of the Request for Proposal). Please note, all disposal prices are to be inclusive of any and all transportation, taxes, approval and disposal fees; as well as any labor and analytical costs for sampling materials required for disposal facility acceptance and approval.

All prices shall include the Subcontractor's costs associated with the transportation and disposal costs along with any and all taxes and other applicable fees. Offeror shall also specify in their proposal the cost per hour per truck for demurrage, if any, and specify at what time demurrage charges begin after truck has waited on site for loading.

ATTACHMENT B
PROPOSAL PRICE FORM

WASTE TRANSPORTATION AND DISPOSAL SERVICES
TANK FARM NO. 4 CLOSURE

Transportation and Disposal Services	Estimated Quantity (1)	Unit Cost
1. Product Oil	1,010,565 gallons	
a. Price if Non-hazardous		/gallon
b. Price if RCRA Hazardous Waste, D004-D043		/gallon
c. Price if PCBs>50 PPM		/gallon
2. Sludge Non-Hazardous	230,730 gallons	
a. Price if Non-hazardous		/gallon
b. Price if PCBs> 50 PPM		/gallon
3. Sludge Hazardous	54,910 gallons	
a. Price if RCRA Hazardous Waste, D004-D043		/gallon
b. Price if PCBs> 50 PPM		/gallon
4. Drummed Oil contaminated debris/sludge	110 (55 gallon drum)	
a. Price if Non-hazardous		/drum
b. Price if RCRA Hazardous Waste, D004-D043		/drum
c. Price if PCBs> 50 PPM		/drum
5. Oil contaminated PPE/debris	55 tons (11 roll-offs)	
a. Price if Non-hazardous		/ton
b. Price if RCRA Hazardous Waste, D004-D043		/ton
c. Price is PCBs> 50 PPM		/ton
6. Oil contaminated soil	1,000 tons	
a. Price if Non-hazardous		/ton
b. Price if RCRA Hazardous Waste, D004-D043		/ton
c. Price if PCBs> 50 PPM		/ton
7. Bag Filters	2 drums	/drum
a. Price if Non-hazardous		
b. Price if RCRA Hazardous Waste, D004-D043		
8. Clean construction debris	60 tons (6 roll-offs)	
a. Price solid waste facility		/ton
9. Decontamination Water	5,000 gallons	
a. Price if RCRA Hazardous Waste, D004-D043		/gallon
b. Price if PCBs> 50 PPM		/gallon
c. Price is Non-hazardous		/gallon
10. Miscellaneous lab Pack Chemicals	one drum	
a. Price if Non-hazardous		/drum
b. Price if RCRA Hazardous Waste, D004-D043		/drum
11. Roll-off Rental	3 containers	
a. Monthly rental (per container) 20 cu. yd.	6 months	/month
b. Weekly rental (per container) 20 cu.yd.		/week
c. Drop-off fee (per container required)		/container
d. Weekly rental (per container) 30 cu. yd.		/week
e. Monthly rental (per container) 30 cu. yd.		/container

Transportation and Disposal Services	Estimated Quantity (1)	Unit Cost
12. Vac Truck Service		
a. Vac truck mobilization fee	5 times	/each
b. Vac truck monthly rental fee	3 months	/month
c. Vac truck weekly rental fee	4 weeks	/week
d. Vac truck operation		/hour
e. Vac truck stand by time		/hour
f. Vac truck labor PPE	lump sum	/day

NOTE: 1. Estimated quantities may vary. Payments shall be based on unit price times actual quantity.

2. Unit cost for various waste streams includes container drop-off/pick-up and up to one (1) week of site mobilization. Container rental fee will apply after one (1) week on site.

3. Offer shall specifically state minimum load requirements, otherwise minimum load shall not be applicable.

Company Name and Address:

EXHIBIT A

US NAVY NORTHERN DIVISION
REMEDIAL ACTION CONTRACT (RAC)
CONTRACT NO. N62472-94-D-0398
DELIVERY ORDER NO. 0013

STATEMENT OF WORK
FOR
DEMOLITION SCRAP METAL RECYCLING
SOW-1284-13-13

TANK FARM NO. 4 REMEDIAL ACTIONS
NAVAL EDUCATION AND TRAINING CENTER (NETC)
NEWPORT, RHODE ISLAND

APRIL 1996

Prepared by

Foster Wheeler Environmental Corporation
470 Atlantic Avenue
Boston, MA 02210

Revision	Date	Prepared By	Approved By	Pages Affected
Rev. 0	4/18/96	K. Shah/G. Karwoski	M. Zizza	All

CONTENTS

FIGURES

ATTACHMENT

1.0 GENERAL DESCRIPTION

1.1 Purpose

This Statement of Work (SOW) provides a description of recycling services required by Foster Wheeler Environmental Corporation at the Tank Farm No. 4 at Naval Education and Training Center (NETC) facility in Newport, Rhode Island. Material to be recycled will consist of scrap metal resulting from demolition of piping, pipe valves and metal support structure.

1.2 Site Location

The Site location is approximately 25 miles southeast of Providence, Rhode Island in the town of Portsmouth, Rhode Island (Newport County) as shown in Figure 1-1. The Defense Highway is to the north/northwest of the site, Narragansett Bay is located 500 to 1,000 feet to the west and Norman's Brook is located in the southwest corner of the Site. A residential area is located to the southeast of the Site and undeveloped woodlands are located north/northeast of Tank Farm 4. Located to the south and to the north are NETC Tank Farm 5 and Tank Farm 3, respectively. Refer to Figure 1-2 for Site Layout.

1.3 Project Description

The NETC Tank Farm 4 consists of approximately 90 acres of open land containing 12 large reinforced concrete underground storage tanks (USTs) owned and controlled by the Navy. Tank Farm 4 is located approximately 20 to 111 feet above sea level. The tank farm was constructed by the Navy in 1941 and was used to store liquid petroleum products. However, the USTs have not been in use since the 1970's.

In 1992, the State of Rhode Island revised UST regulations to include those USTs storing fuel oil, therefore, the USTs at NETC Tank Farm 4 became subject to these closure requirements. The Navy initiated the process for permanent closure of the USTs, and in 1996, Foster Wheeler Environmental was selected as the Contractor to complete the closure of the USTs in Tank Farm 4. Closure activities will include removal of all contents from the USTs, and cleaning and repairing the USTs. The contaminants of concern at Tank Farm 4 are those associated with petroleum based products and asbestos pipe insulation.

2.0 SCOPE OF WORK

Site materials not suitable for landfilling, such as scrap metals, will be removed from the site for recycling or proper disposal. Work to be accomplished by the Subcontractor, corresponding to this scope of work, will include providing roll-off containers for scrap metal collection, transporting of the metal material from the site and recycling or disposal of the metal material at an approved facility.

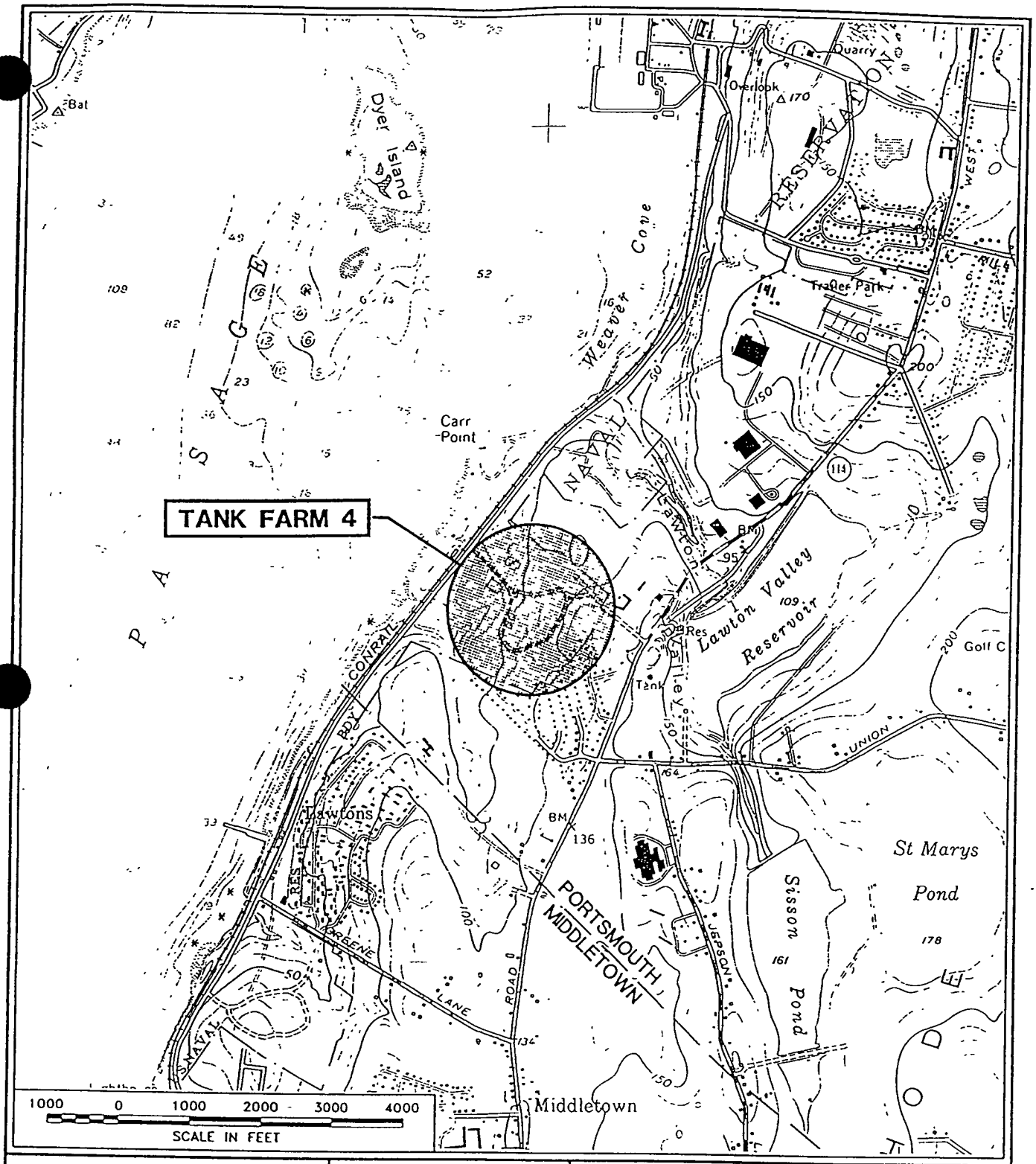


FIGURE 1-1

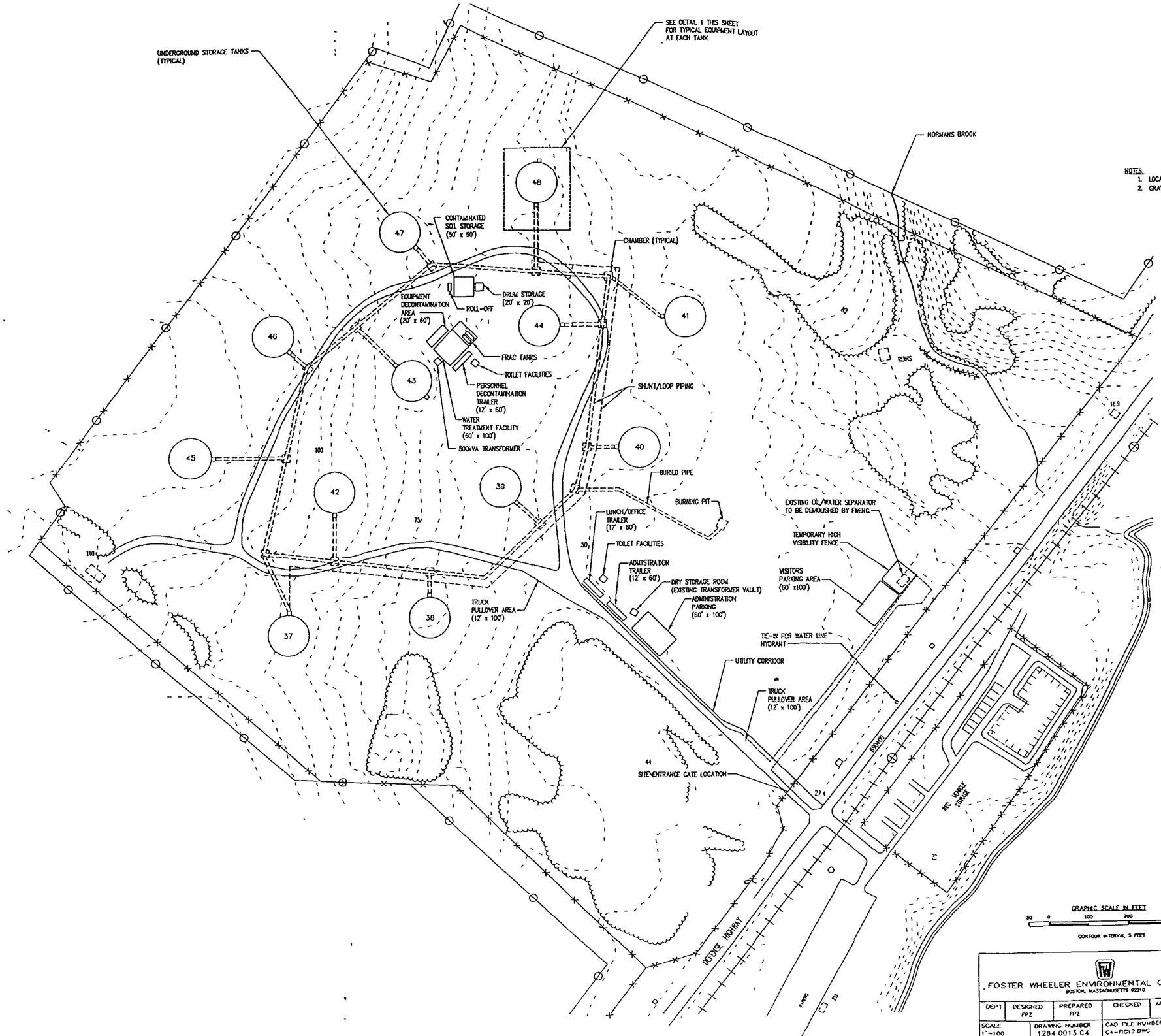
Naval Education and Training Center
Newport, Rhode Island

SITE LOCATION MAP

SCALE: AS SHOWN	PROJ. NO. 1284.0013.0103

CADFILE 1284FG11.DWG

CTM	ZONE		BASE	APPROVED



NOTES:
1. LOCATION OF EQUIPMENT MAY BE FIELD ADJUSTED AS NECESSARY.
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N

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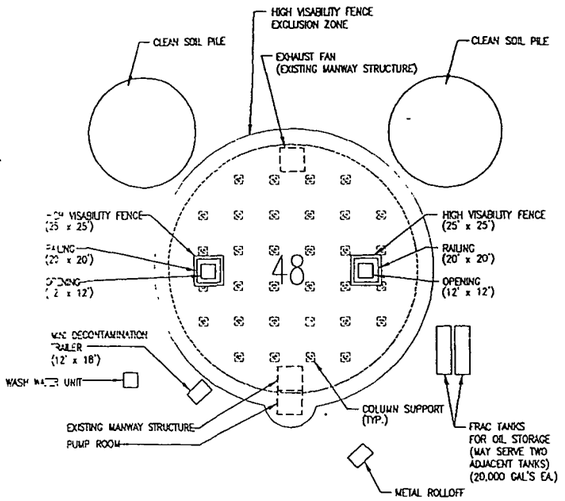


DETAIL 1

TYPICAL EQUIPMENT LAYOUT
AT EACH TANK LOCATION
SCALE: 1" = 50'

PREPARED BY:

FOSTER WHEELER ENVIRONMENTAL CORPORATION
470 ATLANTIC AVENUE, BOSTON, MASSACHUSETTS 02210

BASE MAP DERIVED FROM:
MELVILLE SOUTH, EXISTING CONDITIONS MAP, NETC DWG 31062-307 DATED 4/95, FROM THE DEPARTMENT OF THE NAVY, NAVAL FACILITIES ENGINEERING COMMAND, EDUCATION AND TRAINING CENTER, NEWPORT, RHODE ISLAND

GRAPHIC SCALE IN FEET
50 0 100 200 300 400
CONTOUR INTERVAL 5 FEET

FIGURE 1-2

FOSTER WHEELER ENVIRONMENTAL CORPORATION
BOSTON, MASSACHUSETTS 02210

DEPT	DESIGNED	PREPARED	CHECKED	APPROVED	DATE
	FPZ	FPZ			4/16/96

SCALE	DRAWING NUMBER	CAD FILE NUMBER	SH	OF	REV
1"=100	1284 0013 C4	C4-FIG12.DWG			

NETC DWG NO	XXXXXX
DSGN	XXXXX
DR	XXXX
BR	
DIR	
APPROVED / DATE	
SATISFACTORY TO / DATE	

DEPARTMENT OF THE NAVY NAVAL FACILITIES ENGINEERING COMMAND
NAVAL EDUCATION AND TRAINING CENTER
NEWPORT, RHODE ISLAND

TANK FARM 4 CLOSURE
NAVY REMEDIAL ACTION CONTRACT
DELIVERY ORDER NO 13
SITE PLAN

SIZE	CODE IDENT NO	MANFAC DRAWING NO.
F	80091	
SCALE XXXX		CONSTR. CONTR. NO XXXXX
		SPEC XXXXX / SHEET X OF X

3.0 HEALTH AND SAFETY

Subcontractor personnel working on site must follow the directions of Foster Wheeler Environmental's Site Health and Safety Officer (SHSO) and the Site Health and Safety Plan (SHSP) to protect site personnel and/or the environment. The SHSP is available for review and will be furnished to the Subcontractor upon award of contract and prior to on-site activities. Since the scrap metal containing roll-offs will not be staged in the exclusion zone, the Subcontractor's personnel picking up and transporting the containers will not be required to meet the medical and training requirements of the SHSP and OSHA. Foster Wheeler Environmental will provide management and oversight over all on-site Health and Safety activities. Foster Wheeler Environmental's SHSO will have the authority to cease the Subcontractor's operations if the SHSO judges that those operations are in violation of Foster Wheeler Environmental's SHSP.

4.0 MATERIALS

Recyclable materials will consist of all scrap metal recovered from demolition activities at the site. The NETC Tank Farm 4 drawings and the existing Tank Farm 5 records of scrap metals were reviewed by Foster Wheeler Environmental personnel in order to estimate the total amount of metal materials to be removed from the site. Estimated quantities of scrap metal totals 600 tons of steel piping and 100 tons of miscellaneous steel. These materials include:

MATERIAL (Carbon Steel)	TONS
Piping-(<6")	75
Piping-(6"-8")	125
Piping-(>8")	400
Valves/Flanges/Pumps/Motors, etc.	100

5.0 RESPONSIBILITIES OF THE SUBCONTRACTOR

The Subcontractor shall be responsible for providing roll-off, or equivalent, transport containers and for transporting the scrap material for recycling or disposal. All materials accepted for recycling or disposal must be removed within one business day after a request is made by Foster Wheeler Environmental. Once removed from the site, the Subcontractor shall be responsible for recycling or disposal of all the materials.

The roll-off containers provided, shall be visually inspected by Foster Wheeler Environmental and must be clean of solids and other contaminants. Containers that fail to pass visual inspection may be returned to the subcontractor at no cost to Foster Wheeler Environmental.

5.1 Permits and Licenses

All activities performed by the Subcontractor shall meet all applicable Federal, State and Local Regulations. The Subcontractor shall be responsible for obtaining and complying with all applicable permits obtained for their work associated with this project. In addition, the subcontractor will provide documentation of all licenses and permits required to complete this work.

5.2 Inspection of Materials

The Subcontractor shall be responsible for performing an inspection prior to transportation from the site of the materials provided by Foster Wheeler Environmental to insure cleanliness and suitability for recycling or disposal.

5.3 Bills of Lading

Subcontractor is responsible to provide blank Bills of Lading upon award of contract to be maintained at the site. Subcontractor will complete the Bill of Lading with all appropriate information and present to Foster Wheeler Environmental for signature prior to departure from the site.

5.4 Transportation

The subcontractor shall be responsible to furnish a sufficient quantity of roll-offs, or other approved containers, (estimated to be a quantity of three to nine 30 cubic yard roll-off containers) to meet the production rates of demolition, or a quantity as determined by the Site Manager. It is estimated that at normal production, approximately three (3) containers per every two (2) weeks will be required. It is estimated that at peak production a minimum of six (6) containers per week will be required. The subcontractor shall drop off and pick up roll-offs within 24 hours notice from Foster Wheeler Environmental.

The transport driver shall ensure that the scrap material has been placed on the vehicles in a balanced load for safe transportation. The Subcontractor shall be responsible for covering and securing the load for transport to the approved recycling or disposal facility.

The material must be weighed at the public truck weigh scales, or at the recycling/disposal facilities weigh scale and provide a certified weight receipt to Foster Wheeler Environmental Corporation.

The licensed transporter shall comply with DOT regulations. The transporter is subject to approval by Foster Wheeler Environmental.

5.5 Metal Recycling

The Subcontractor shall provide or identify a suitable facility(ies), subject to approval by Foster Wheeler Environmental and the Navy for all the scrap material accepted for recycling or disposal.

6.0 RESPONSIBILITIES OF FOSTER WHEELER ENVIRONMENTAL

6.1 Site Access

Access to the site shall be arranged by Foster Wheeler Environmental, through the US Navy, prior to commencement of the work. No Subcontractor personnel are to enter onto any portion of the site without first obtaining approval from Foster Wheeler Environmental. Equipment access to the site shall be permitted only with Foster Wheeler Environmental's prior approval. Trucks will enter the site at the entrance road off the Defense Highway.

6.2 Site Manager

The Foster Wheeler Environmental Site Manager will act as the on site interface point between the Subcontractor and Foster Wheeler Environmental. The Site Manager, or a designee, will assist in the coordination of the Subcontractor's activities and the work of others being performed concurrently.

In addition it will be the responsibility of the Site Manager to receive signature from the US Navy representative for all Bills of Lading prior to removal of materials from the site.

6.3 Decontamination

All pumps, valves, flanges, plates and other miscellaneous metals will undergo a decontamination in accordance with the Steel Processing and Handling Standard Operating Procedure (SOP) developed for Tank Farm 4, before being available for removal from the site for recycling or disposal. Non-process metals will be visually inspected and rinsed to remove visible residue prior to loading onto subcontractor containers.

6.4 On-Site Processing

Materials will be processed on-site by Foster Wheeler Environmental to a minimal manageable size, as is reasonably possible. After processing, if applicable, the materials will be staged on-site in roll-off or equivalent containers. In all cases, Foster Wheeler Environmental personnel will be responsible for loading of all the scrap material onto the Subcontractor's roll-off container or an equivalent transport container. The subcontractor shall ensure that the scrap material has been placed in a balanced load for safe and secure transportation to the approved recycling or disposal facility prior to removing the roll-off containers from the site.

6.5 Documentation

Foster Wheeler Environmental will provide written documentation that the process metals have been decontaminated in accordance with the Pipe Draining and Free Liquid Removal SOP (SOP-1284-13-07) and Steel Processing and Handling SOP (SOP-1284-13-12).

7.0 WORK SCHEDULE

Metal material is anticipated to be available for removal beginning in the summer of 1996 and continuing through summer of 1997. The Subcontractor shall provide initial set of drop off of roll-off containers or equivalent, within two days after receiving written notification. In addition, the Subcontractor must be able to respond to a materials pick-up and drop off /roll off containers replacement request within 24-hours.

8.0 QUALITY CONTROL

The Subcontractor shall perform high quality work in accordance with this SOW and all permits or applications required. All field activities shall be conducted in an efficient and professional manner with minimal damage to the environment. All deficiencies in material, activities, or workmanship shall be corrected by the Subcontractor at no additional cost to Foster Wheeler Environmental or the US Navy.

9.0 SUBMITTALS

The following submittals are required under this subcontract:

- DOT Training, DOT License and DOT Physician's Statement Documentation - with proposal
- Bills of Lading - signed by receiving facility within thirty days of removal of waste material
- Weight Tickets from recycling facility or a commercial public weight scale - within thirty days of receipt at facility
- Certification of Calibration of weigh scales at receiving facility
- Copies of all permits and licenses for transporter and recycling facilities

10.0 MEASUREMENT AND PAYMENT

10.1 Material (Piping, Valves, Fanges, Pumps, Motors, etc.)

Payment for the materials accepted and removed for recycling or disposal, as described in this SOW, shall be on a per-ton-removed basis. Material weights shall be accepted by Foster Wheeler Environmental based on the certified weight tickets.

All prices shall include the Subcontractor's costs associated with the transportation and recycling or disposal costs along with any and all taxes and other applicable fees. Note, as may be expected in the case of a subcontract for recycling services, Offerors may propose to make payment to Foster Wheeler Environmental based upon the Gross Tons of scrap metals received. In such case, such payment should be net the Offeror's costs for transportation and recycling of the scrap materials as well as any other taxes and applicable fees.

Payment shall be made to Foster Wheeler Environmental within 30 days after removal of each load of material from site.

10.2 Rental Charges and Demurrage

Payment includes container drop off/pick-up and a minimum of two weeks of site mobilization. Demurrage may apply after a minimum of two hours on-site waiting.

All charges for rental and demurrage shall be per the unit prices provided in the Price Quotation Form, Attachment B.

Offeror shall also specify in their proposal the cost per hour per truck for demurrage, if any, and specify at what time demurrage charges begin after truck has waited on site for loading.

PRICE QUOTATION
METAL/STEEL TRANSPORTATION AND RECYCLING

ATTACHMENT B

Naval Education Training Center (NETC), Newport, Rhode Island

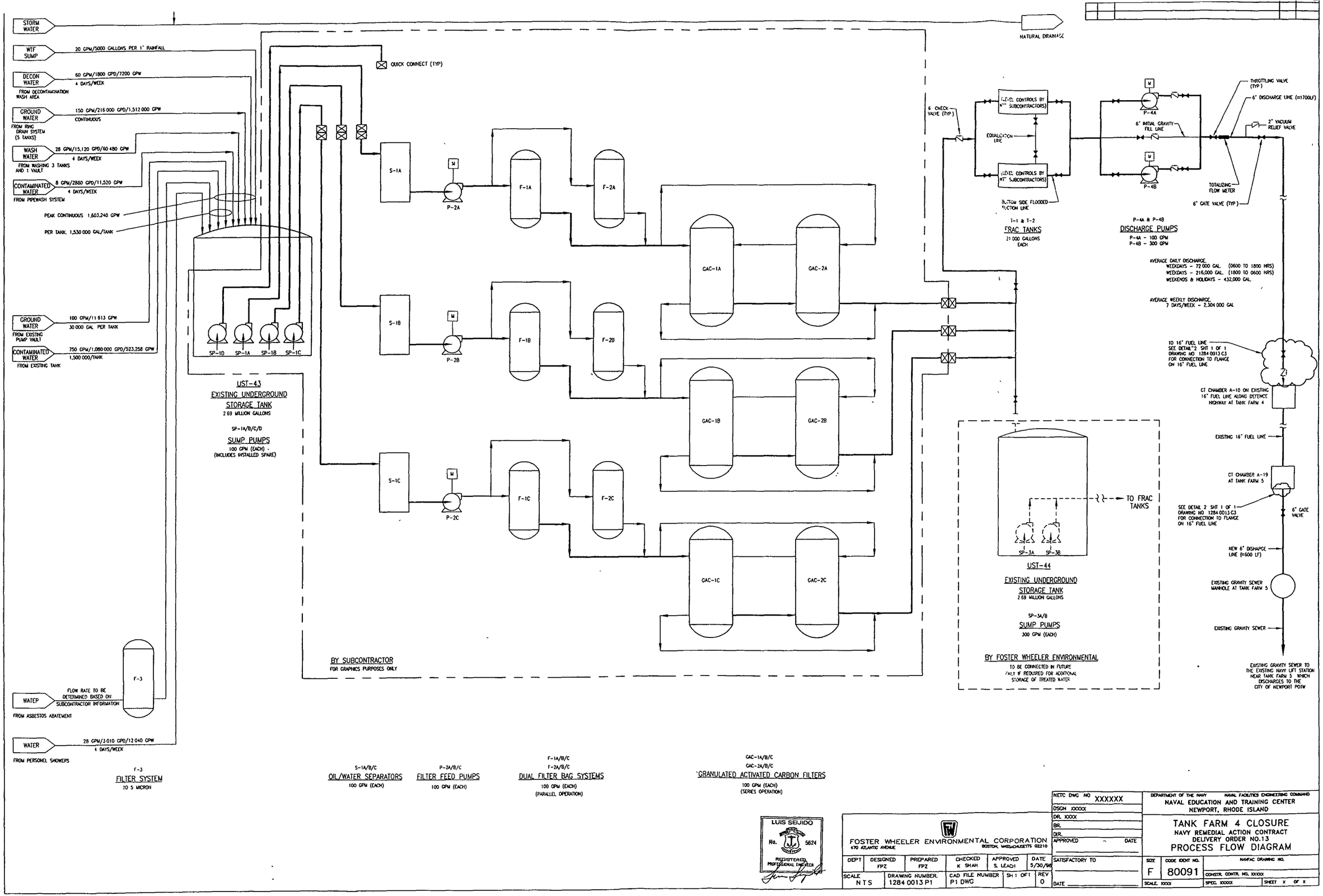
Transportation & Recycling Services	Estimated Quantity (tons)	Unit Payment (per ton) To Foster Wheeler Environmental	Extended Payment
a. Piping-(2"-16"appox)	600	$	$
b. Misc. (valves, flanges, pumps, motors)	100	$	$
c. Weekly Rental of containers (beyond two weeks)		$	$
d. Truck demurrage - per hour		$	$

NOTE: 1. Estimated quantities may vary. Payment shall be based on unit price times actual quantity. Tons shall mean gross tons (2,240 lbs.)

2. Payment includes container drop off/pick-up and a minimum two weeks of site mobilization. Demurrage may apply after a minimum of two hours on site waiting.

3. Payment is net cost, inclusive of all subcontractor costs including transportation, recycling or disposal cost, along with any and all taxes and other applicable fees.

Company Name And Address:



LUIS SEIJIDO
No. 5824
REGISTERED PROFESSIONAL ENGINEER

FOSTER WHEELER ENVIRONMENTAL CORPORATION
470 ATLANTIC AVENUE BOSTON, MASSACHUSETTS 02210

DEPT	DESIGNED	PREPARED	CHECKED	APPROVED	DATE
	FPZ	FPZ	K SHAH	S. LEACH	5/30/98

SCALE	DRAWING NUMBER	CAD FILE NUMBER	SH 1 OF 1	REV
NTS	1284 0013 P1	P1 DWG		0

NETC DWG NO XXXXXX
DSGN XXXXX
DR. XXXX
BR.
DIR.
APPROVED DATE
SATISFACTORY TO
DATE

DEPARTMENT OF THE NAVY NAVAL FACILITIES ENGINEERING COMMAND
NAVAL EDUCATION AND TRAINING CENTER
NEWPORT, RHODE ISLAND

TANK FARM 4 CLOSURE
NAVY REMEDIAL ACTION CONTRACT
DELIVERY ORDER NO.13
PROCESS FLOW DIAGRAM

SIZE	CODE IDENT NO.	NAVFAC DRAWING NO.
F	80091	
SCALE XXXX	SPEC. XXXXX	CONSTR. CONTR. NO. XXXXX SHEET X OF X